

Research of CRS Side Impact Test by Acceleration Type Sled System

JASIC / Japan



Background & Purpose

- ✓ NTSEL (type approval test department) has the acceleration type sled test system. So it is necessary to confirm that the CRS side impact sled test can be tested by acceleration type sled test system.

- ✓ We done 2 series of CRS side impact sled tests by acceleration type sled test system
 1. Try to reproduce the dummy and vehicle behavior of full car side impact CRS test.
 2. Try to satisfy the relative velocity corridor which was proposed in the draft new regulation (based on Dec. 2010).

test concept

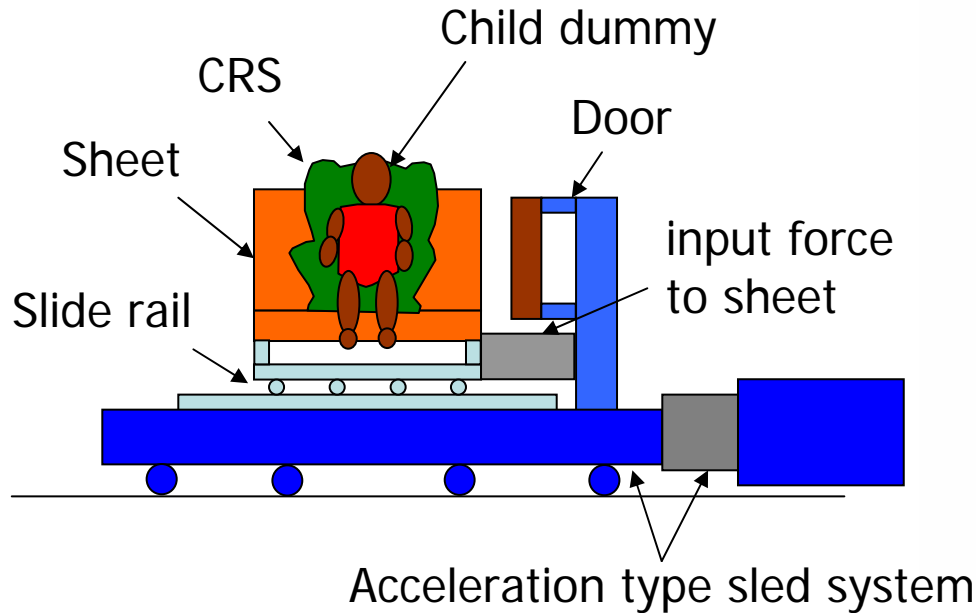


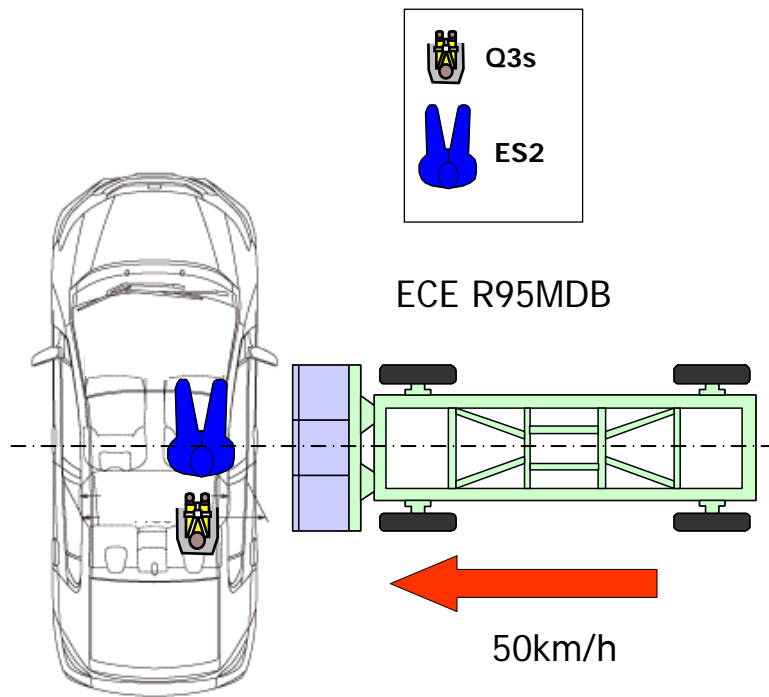
Figure 2. NHTSA's Side Impact Sled Buck Set-up.

reference from ESV 09-0539

Same concept of NHTSA report
(Sled on sled type)

Full car side impact test (reference)

- Conducted under ECE/R95 Side impact test regulation
- Universal type ISOFIX CRS+Q3s dummy at rear seat



test vehicle

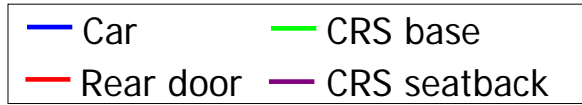


CRS & dummy

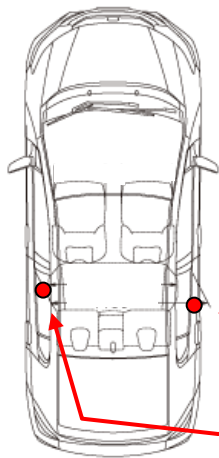
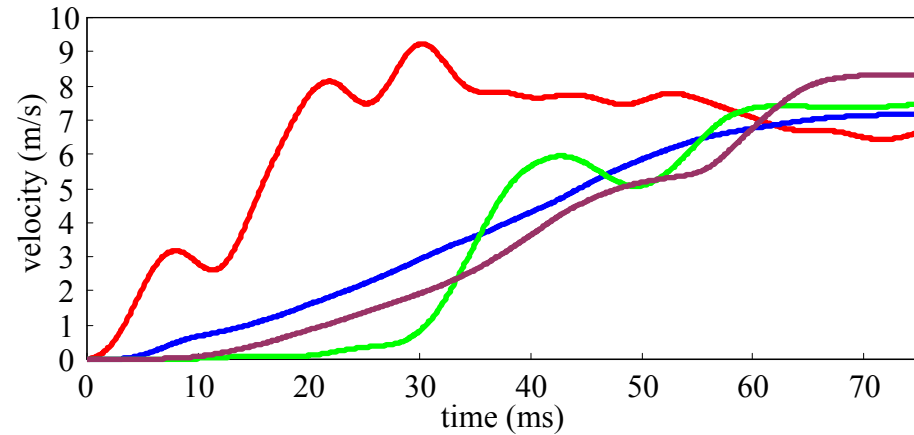
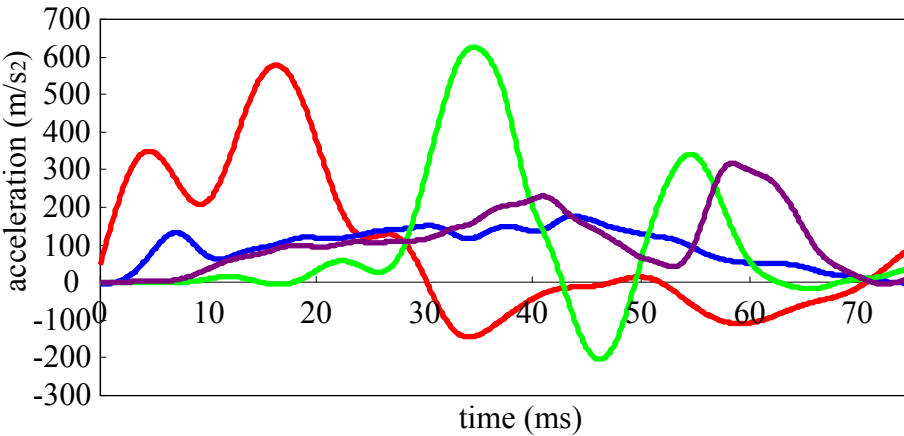


Full car side impact test result

acceleration time histories

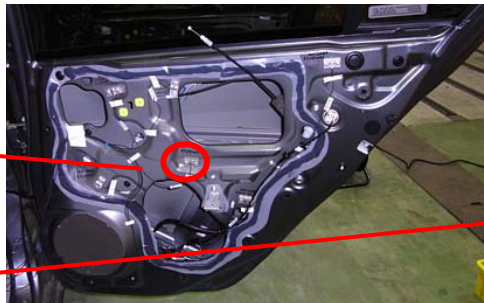


velocity time histories



● Locations of accelerometers

Rear door



Car



seatback

CRS



base

Photos before sled tests

Full car side impact simulated

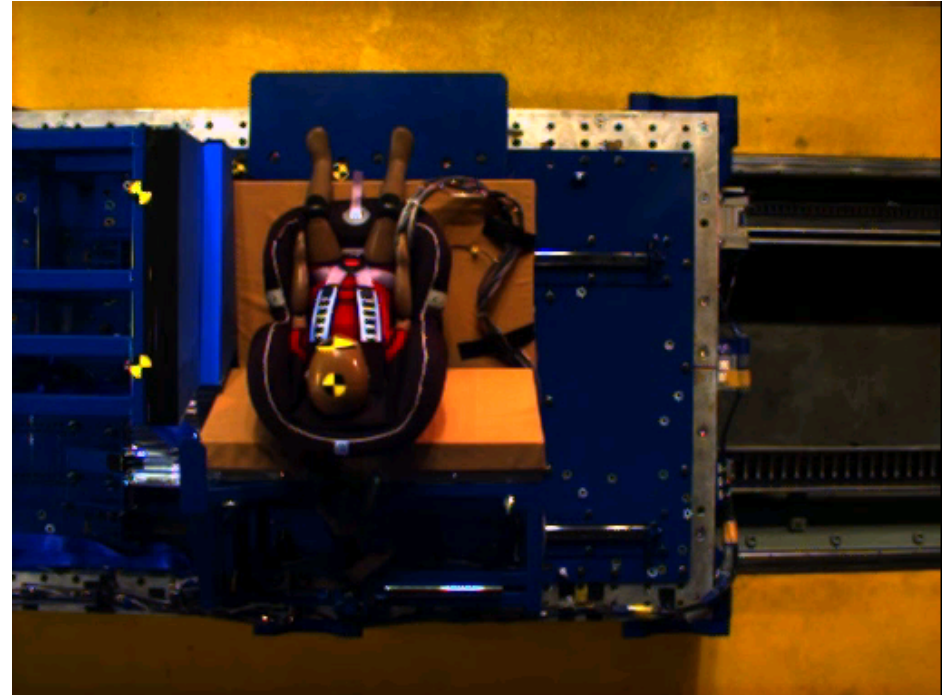


draft regulation corridor



Video of sled tests

Full car side impact simulated

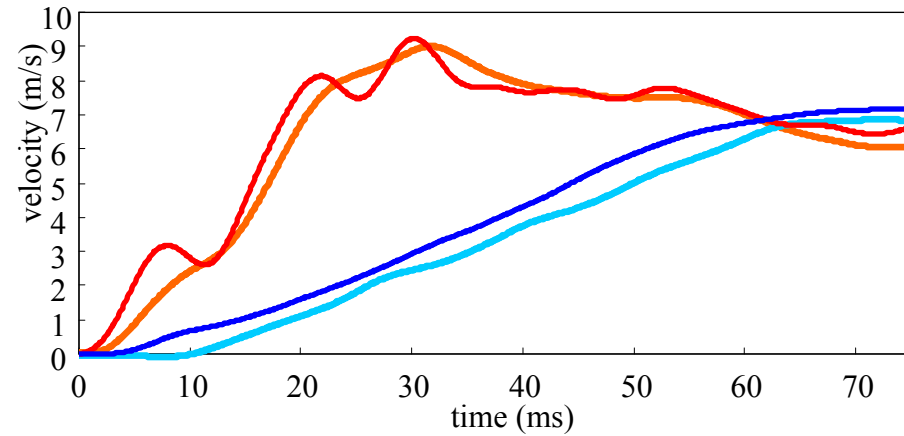
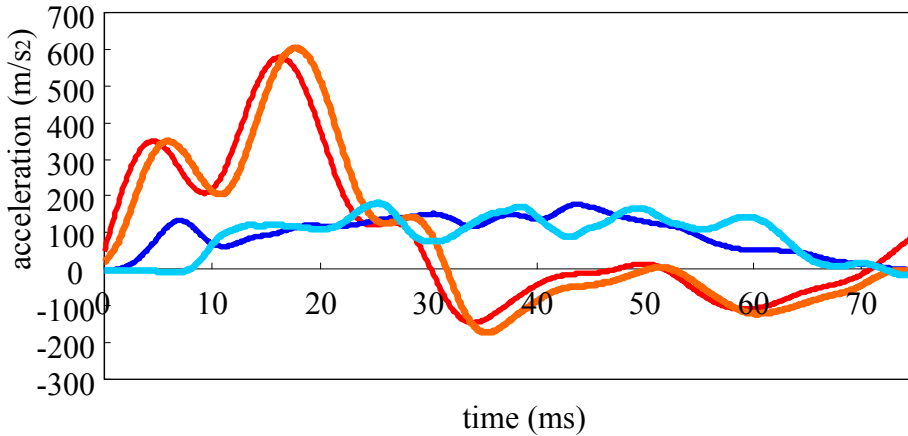


Comparison of the full car test and sled test

acceleration time histories

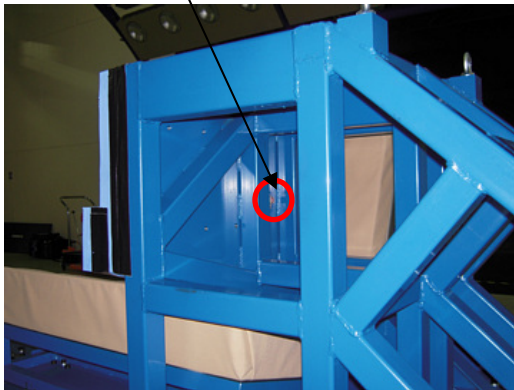


velocity time histories

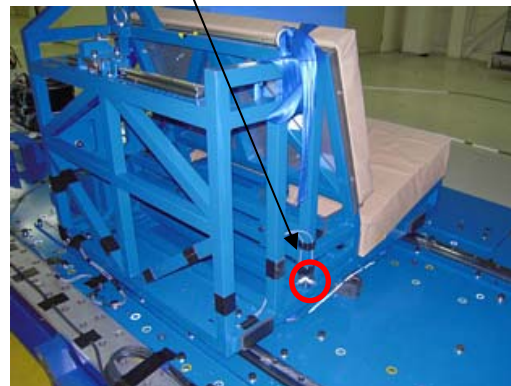


Locations of accelerometers

sled door



sled sheet



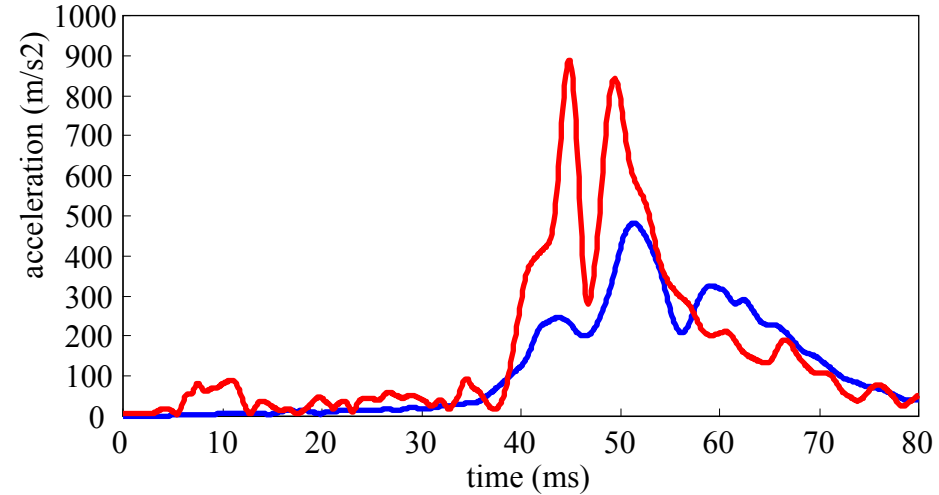
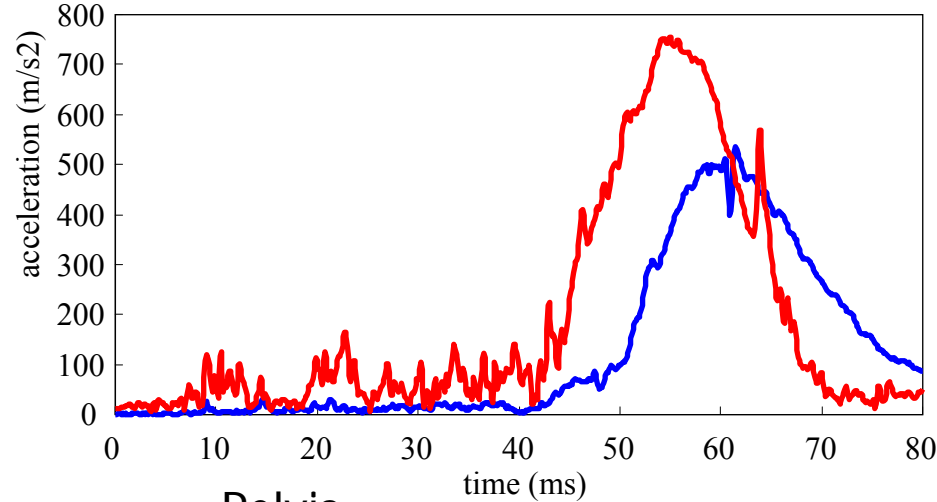
Accelerations and velocities were almost similar

Comparison of the full car test and sled test

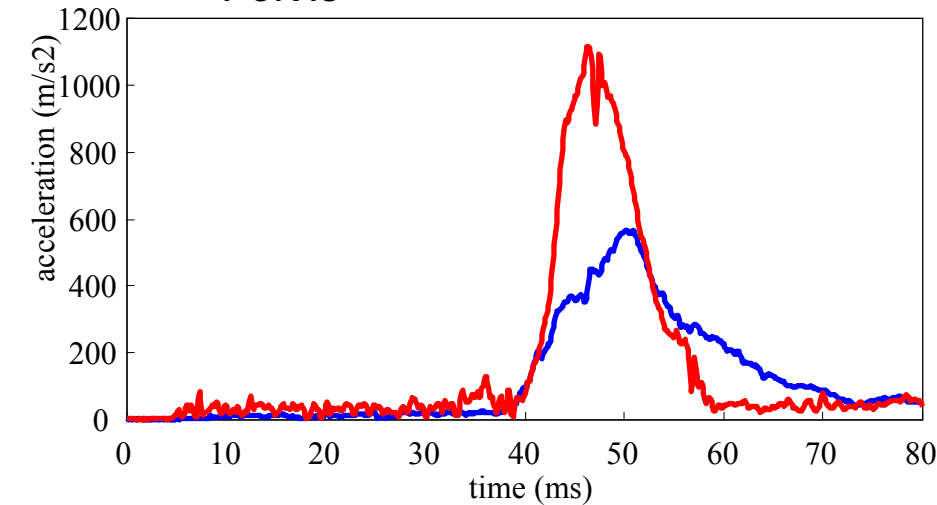
Head

— sled test — Full car test

Chest



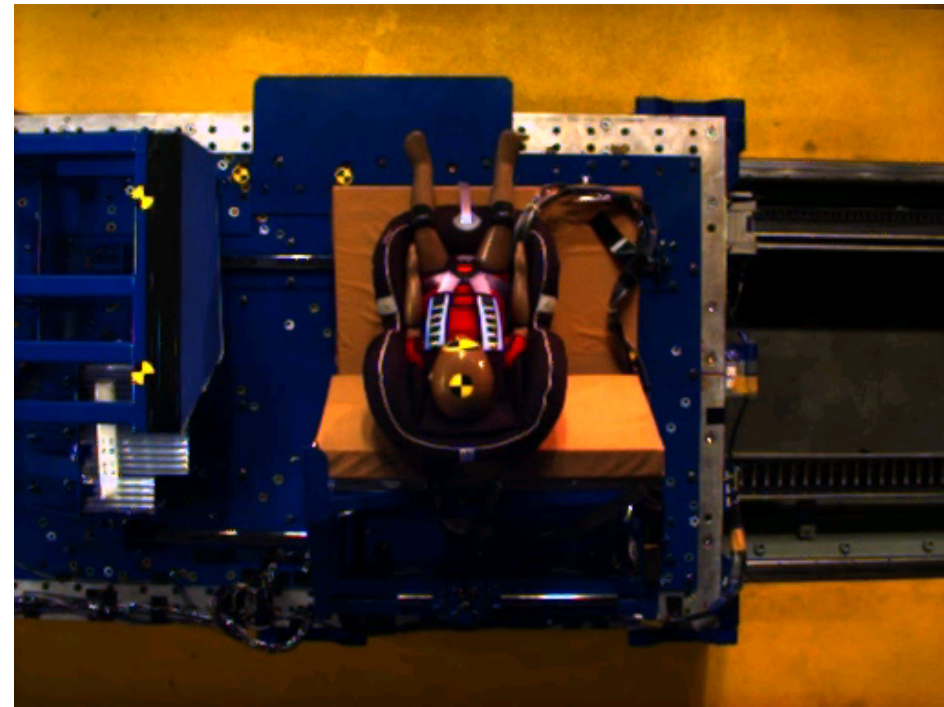
Pelvis



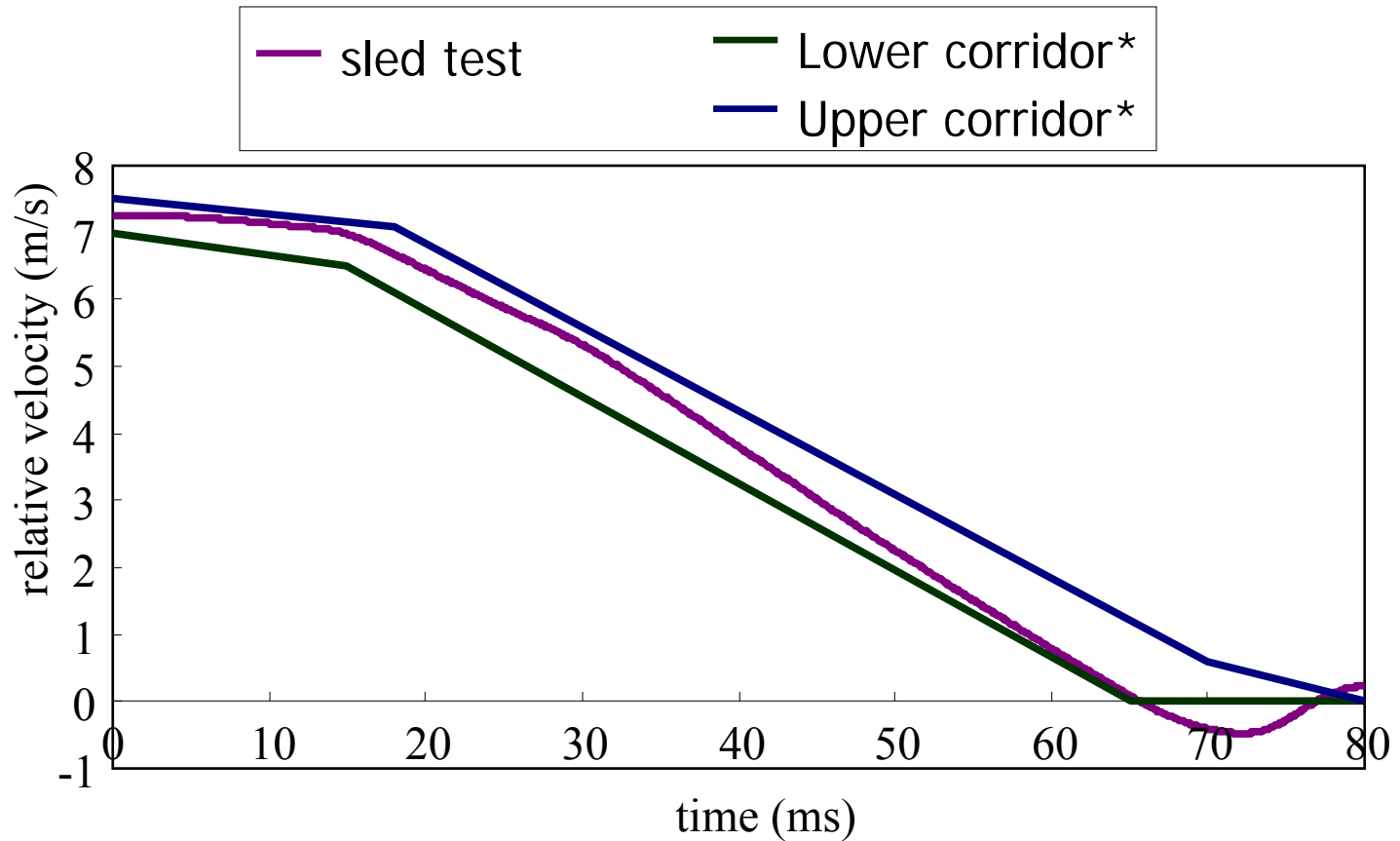
region	injury criteria	unit	car test simulated sled	Full car test
Head	HIC15		454	189
	Max Acc. (3ms)	G	73.9	48.3
Chest	Max Acc. (3ms)	G	61.9	43.3
Pelvis	Max Acc. (3ms)	G	90.6	51.4

Video of sled test

Corridor in new draft regulation

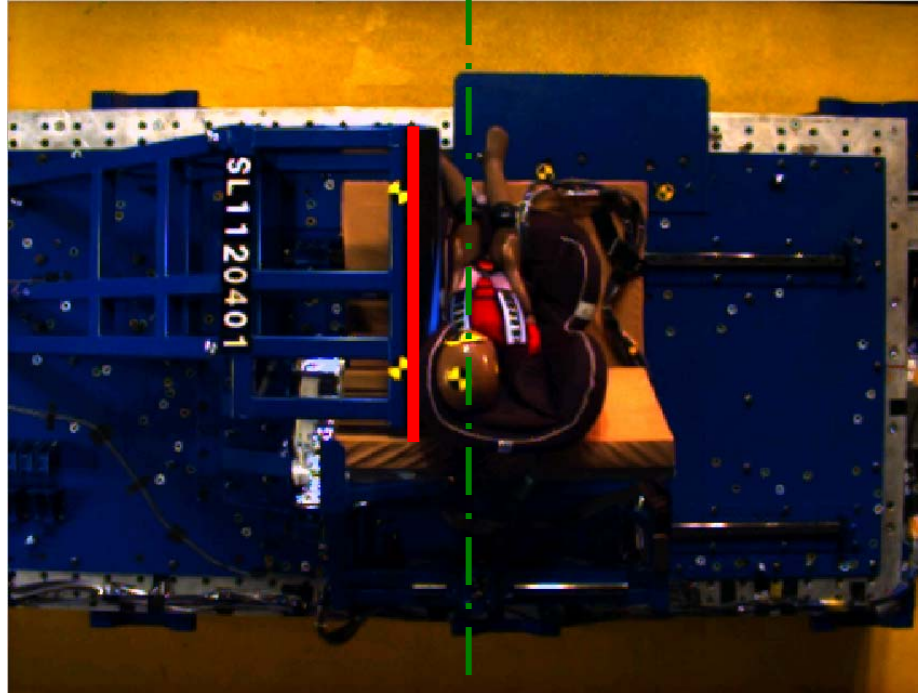


Relative velocity time histories



The relative velocity of sled test was in corridor
(based on Dec. 2010)

Dummy head displacement



Probably we could judge whether dummy head displacement were OK or Not.

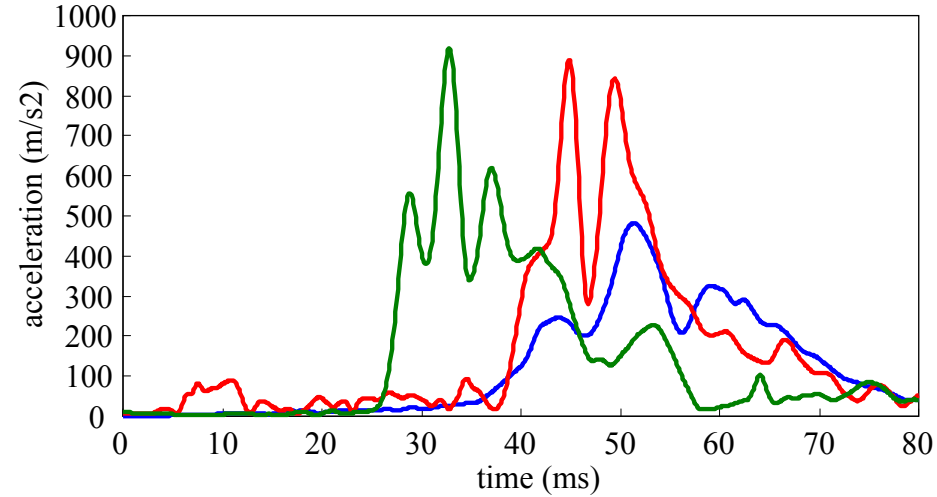
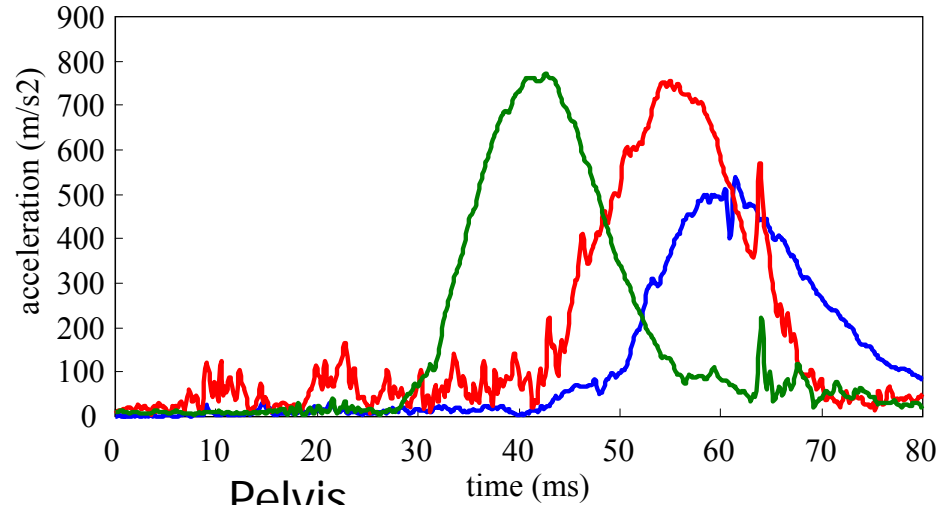
In this test method, we can not set that the dummy head was at the center of the camera correctly. But we can set those near center of the camera.

Comparison of the full car test and sled test

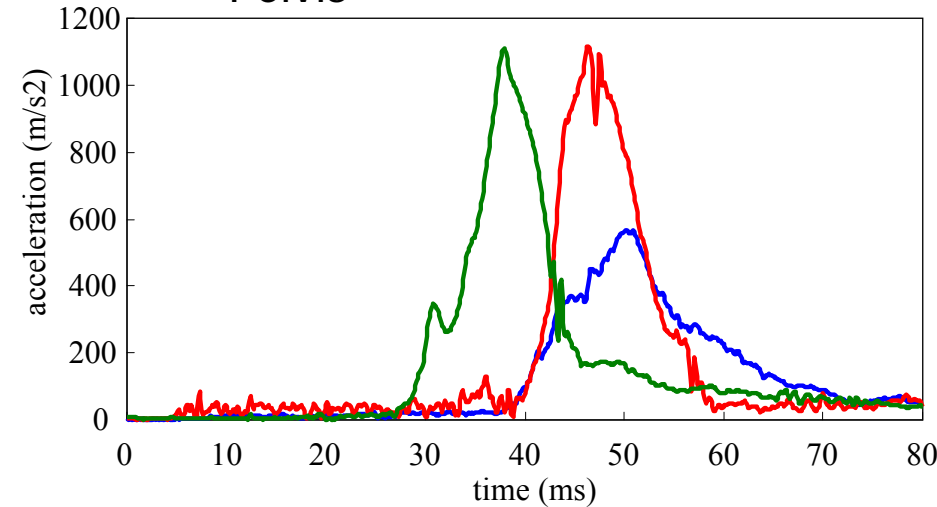
Head

— Full car test — Full car like sled — GRSP Sled

Chest



Pelvis



region	injury criteria	unit	GR Corridor sled	vehilce test simulated sled	Vehicle test
Head	HIC15		485	454	189
	Max Acc. (3ms)	G	76.9	73.9	48.3
Chest	Max Acc. (3ms)	G	46.7	61.9	43.3
Pelvis	Max Acc. (3ms)	G	93.6	90.6	51.4

Conclusion

- ✓ Acceleration and velocity of door and car at full car test were almost similar to those of simulated sled test in this study.
- ✓ The time when dummy's chest and pelvis contact to CRS side wing was almost similar in both tests. But the time when dummy's head contact to CRS side wing was not similar. And the maximum accelerations of dummy in sled test was larger than those in full car test.

Conclusion

- ✓ We satisfy the corridor of side impact test in new CRS draft regulation (before change) used by acceleration type sled system.
- ✓ Injury measures of the new draft regulation test were almost similar to those of the sled test simulated full car side impact test.
- ✓ Probably we can judge the head displacement used by the upper camera.

Next step

- ✓ Check to satisfy new corridor and other conditions defined in new draft regulation
- ✓ Check repeatability
- ✓ We need to compare the test data tested by acceleration type sled system to those tested by deceleration type sled system
- ✓ Check that there are any problem in Phase 2 and 3.

Is there any questions?