Informal Document No.**11**
30th GRSP, 3-6 December 2001,
Agenda Item 1.7.3.

Results of Dynamic Test on Rearward Facing CRS Installed with 45° CRS-Seatback Inclination

Transmitted by the Expert from Japan

1. Purpose of the Test
   1) To investigate whether or not the CRS installed in its 45° tilt seatback position is capable of satisfying the dynamic test requirements of ECE R44. (See photos of Tests No.3 and No.9.)
   2) Also to investigate the above case when a spacer is placed in the gap near the point Cr of the test seat between CRS bottom surface and seat upper surface in order to ensure CRS installation stability in a tilted position. (See photos of Tests No.5 and No.7.)

2. Test Sample
   A rearward-facing CRS complying with ECE R44 and specifically designed for 3-point safety belts. (A popular G0 CRS type in Japan, whose bottom shape can be changed from flat to arched by removing its stand.)

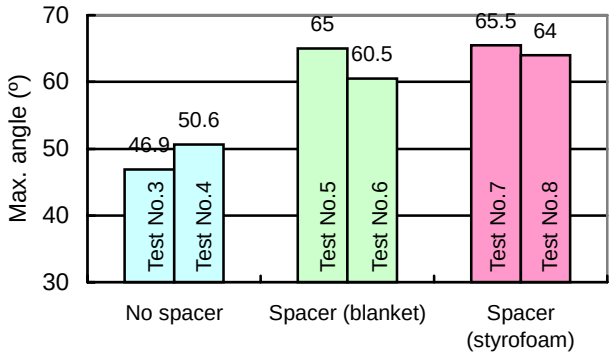
3. Test Method
   1) Acceleration sled tester (see typical sled waveform) 2) 3-point safety belt
   3) TNO P3/4 dummy 4) No. of tests: 2 times for each test condition (see table below)

4. Test Results
   As shown in the table below.

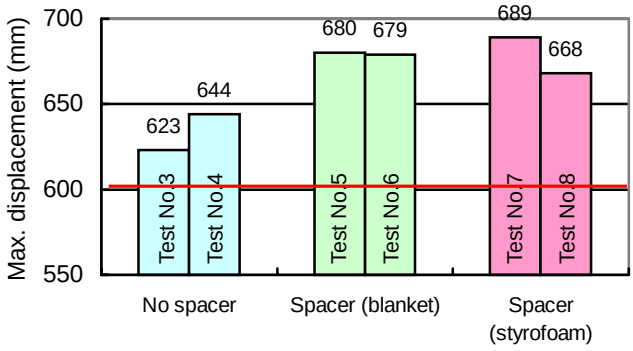
No.	Test conditions					Test results					
	CRS initial seatback angle	Seatback 45° holding spacer	CRS bottom shape	Max. sled acceleration (G)	Max. sled velocity (km/h)	Forward head displacement (mm) ≤ 600	Chest acceleration (G)				Max. CRS seatback angle
							Synthesized (max.)	Synthesized (3msec) ≤ 55	Vertical (max.)	Vertical (3msec) ≤ 30	
1	24.9° (stable angle)	Without spacer	Flat (normal)	24.9	49.3	581	54.9	52.2	28.0	25.6	40.3°
2	26.8° (stable angle)	↑	↑	24.0	49.5	550	49.6	49.6	23.8	23.1	39.1°
3	42.0°	↑	↑	24.3	49.8	***623***	50.6	47.2	39.8	29.1	46.9°
4	44.5°	↑	↑	23.9	49.6	***644***	46.9	45.0	36.5	***33.1***	50.6°
5	44.1°	With spacer (blanket)	↑	23.8	49.6	***680***	49.2	46.3	44.6	***40.9***	65.0°
6	42.1°	↑	↑	23.7	49.8	***679***	49.2	47.3	44.2	***42.2***	60.5°
7	43.6°	With spacer (styrofoam)	↑	24.3	49.7	***689***	49.5	47.1	48.2	***41.1***	65.5°
8	44.3°	↑	↑	24.6	49.5	***668***	47.4	42.1	39.1	***38.3***	64.0°
9	44.2°	Without spacer	Arched (stand removed)	23.3	49.2	***632***	46.3	42.7	39.9	***35.7***	51.9°
10	44.1°	↑	↑	25.0	49.5	***639***	50.2	48.6	35.9	***33.8***	51.1°

1) The CRS in its 45° tilt seatback position failed to satisfy the forward head displacement requirement, irrespective of its bottom shape and the presence/absence of a spacer. (See displacement figures for Test Nos. 3-10.)
2) The CRS in its 45° tilt seatback position hardly satisfied the vertical component requirement of chest acceleration, irrespective of its bottom shape and the presence/absence of a spacer. (See vertical 3msec figures for Test Nos. 4-10.)
3) When a spacer was inserted between CRS bottom and seat to stabilize the CRS in its 45° seatback tilt position, both forward head displacement and vertical chest acceleration G tended to increase due to a rise in the maximum seatback angle of the CRS.

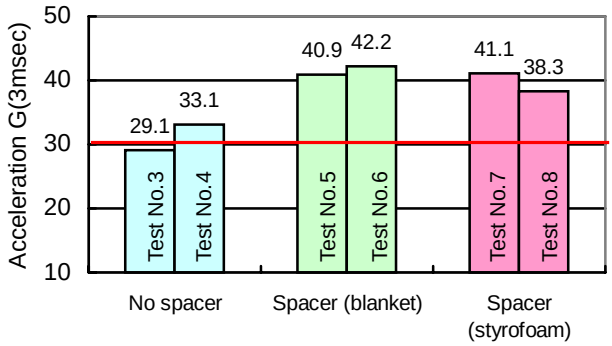
Max. CRS seatback angle



Max. head displacement



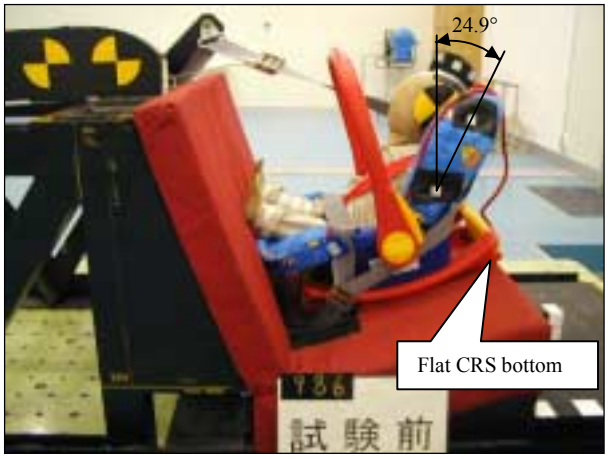
Vertical chest accel.(3msec)



5. Discussion
   1) CRS performance was tested under the conditions of two different CRS bottom shapes and three different CRS installation methods. The results failed to validate the GRSP report that the dynamic test requirements of ECE R44 can be satisfied even if the CRS seatback angle is tilted 45°.
   2) The results indicated that, even though a CRS specialized for 3-point safety belts is selected, it is extremely difficult to meet the two demands simultaneously -- one, installation stability in a 45° tilt position required in the Japanese market and two, compliance to the dynamic test requirements of ECE R44. (While the dynamic test of ECE R44 requires the use of a 3-point retracting belt, many vehicles in the Japanese market are equipped with 2-point safety belts in the rear seat. Even of those vehicles that are equipped with 3-point retracting belts in the rear seat, nearly 70% have rear safety belts that are too short for securing a CRS.)

Test Photos

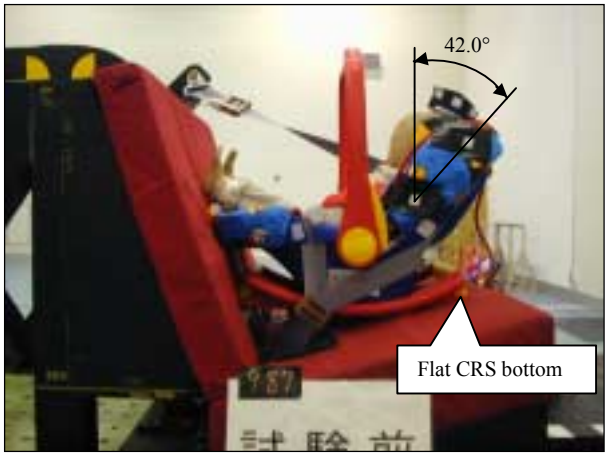
Before test



Test No.1

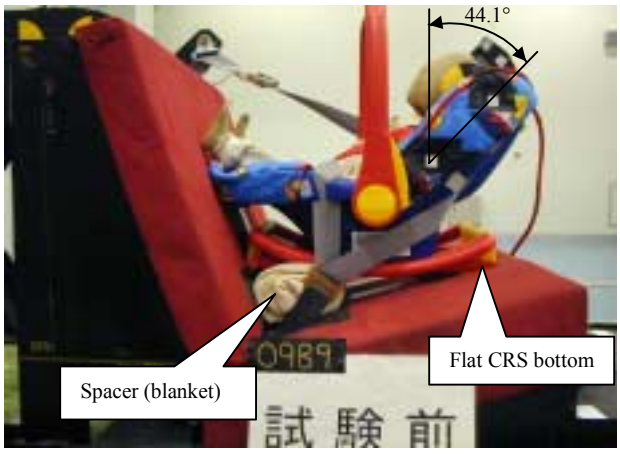
Max. forward head displacement

Test No.1



Test No.3

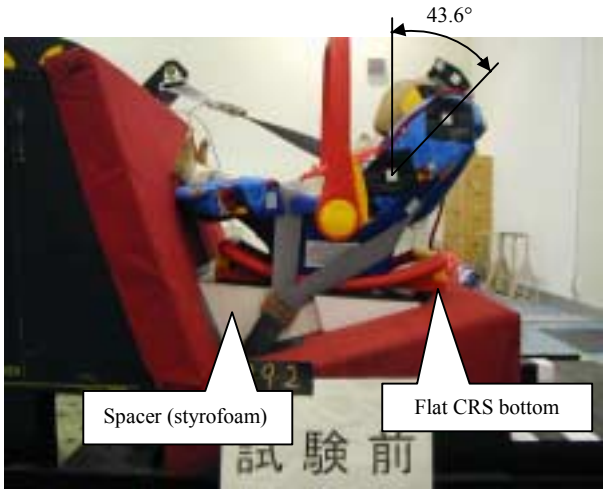
Test No.3



Test No.5

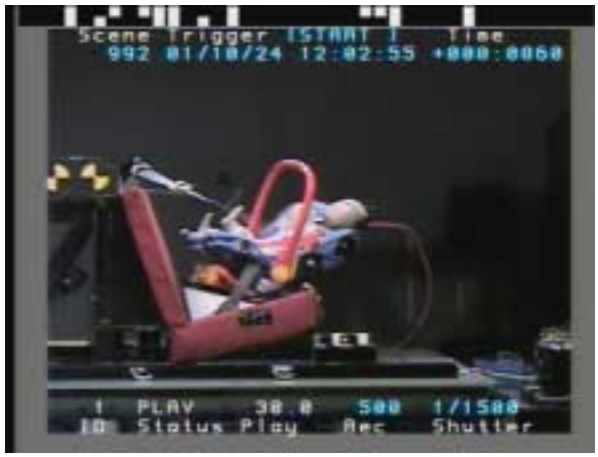
Test No.5

Before test

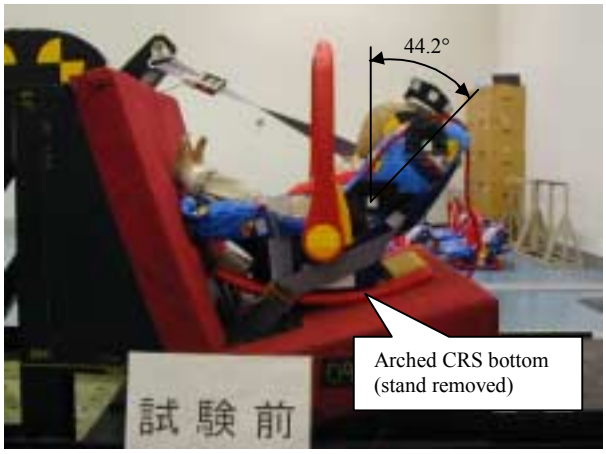


Test No.7

Max. forward head displacement



Test No.7



Test No.9

Test No.9

Typical sled waveform