Submitted by the expert from Japan

Informal document GRSP-70-32
(70th GRSP, 6-10 December 2021,
agenda item 6)

Sled Test Results of Small Female Dummy

National Traffic Safety and Environment Laboratory

Sled Test Conditions

Test conditions

Vehicle : Same vehicle used in ISOFIX booster study

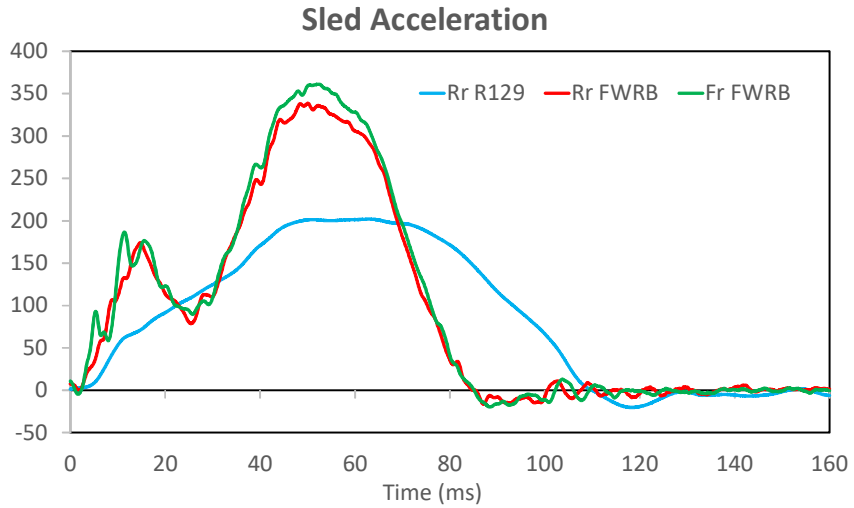
Dummy: Hybrid III AF05

Seating Position: Rear seat, Front seat (reference)

Acceleration pulse: R129 test pulse, vehicle acceleration in 50kph FWRB test

Rear Seat

Front Seat



Sled Test Conditions

Test No.	Seat Position	Test pulse
Test 1	Rear seat	R129
Test 2	Rear seat	50kph FWRB vehicle acceleration
Test 3	Front seat	50kph FWRB vehicle accelerat

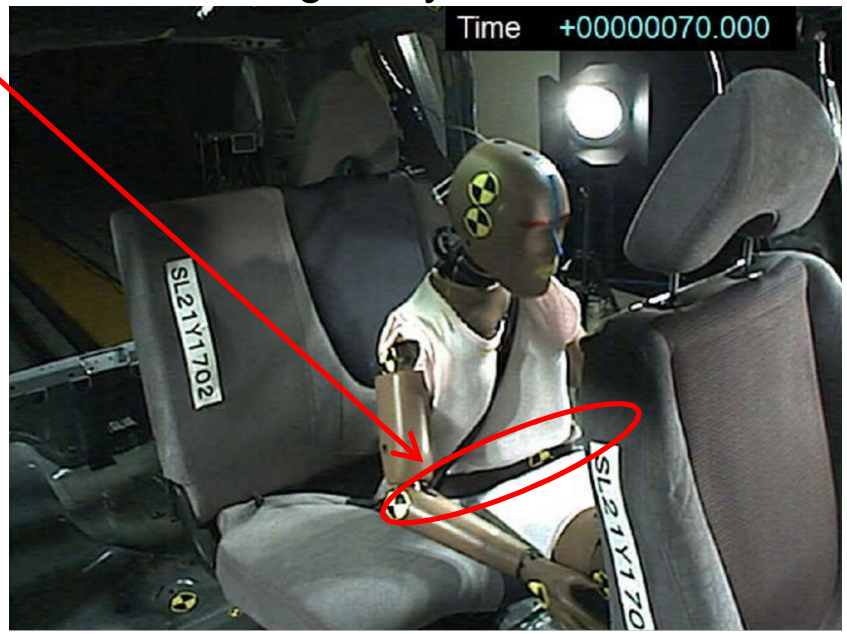
Dummy Kinematic Behavior at 70 ms

Test conditions

Acceleration pulse: vehicle acceleration in 50kph FWRB test

Belt did not come off

Diagonally in front



Move forward largely

Side

- The dummy's pelvis moved forward largely, but the lap belt did not come off.
- The shoulder belt did not slide up. The dummy's head did not contact the front seat back.

[Ref.] Injury Measures

		HIC	Head 3ms maximum acceleration	Neck Fx	Neck Fz	Neck My	Chest displacement	Thigh load
Unit			m/s^2	N	N	Nm	mm	N
Rr Seat	R129	947* (Reference)	719* (Reference)	1,706	2,529	57	36	182
Rr Seat	50kph FWRB	2293* (Reference)	1070* (Reference)	1,874	**4,820**	**62**	**48**	705
Fr Seat	50kph FWRB	350	473	460	717	37	23	146
R137 criteria		**1,000**	**785**	**2,900**	**2,700**	**57**	**42 (34**)**	**7,000**

* Reference because the dummy head didn't contact the front seat
**Series 1 amendments (Injury values for front occupants)

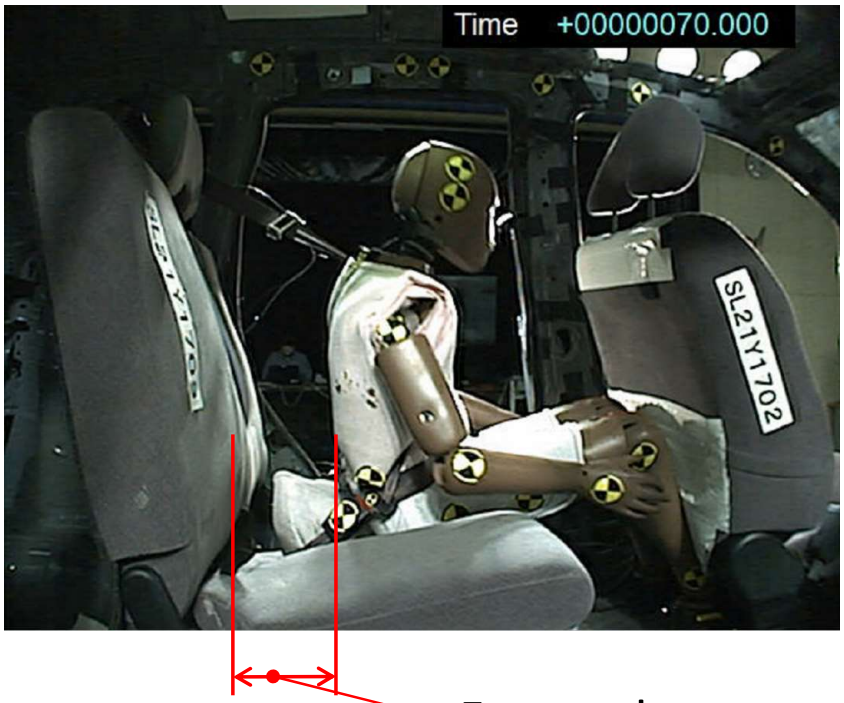
- Neck and Chest injury measures of rear seat occupant in FWRB acceleration test case were over the criteria of UN R137. (The force limiter and pre-tensioner are not equipped with rear seatbelt)

Comparison of the Dummy Behavior at 70 ms

Test conditions

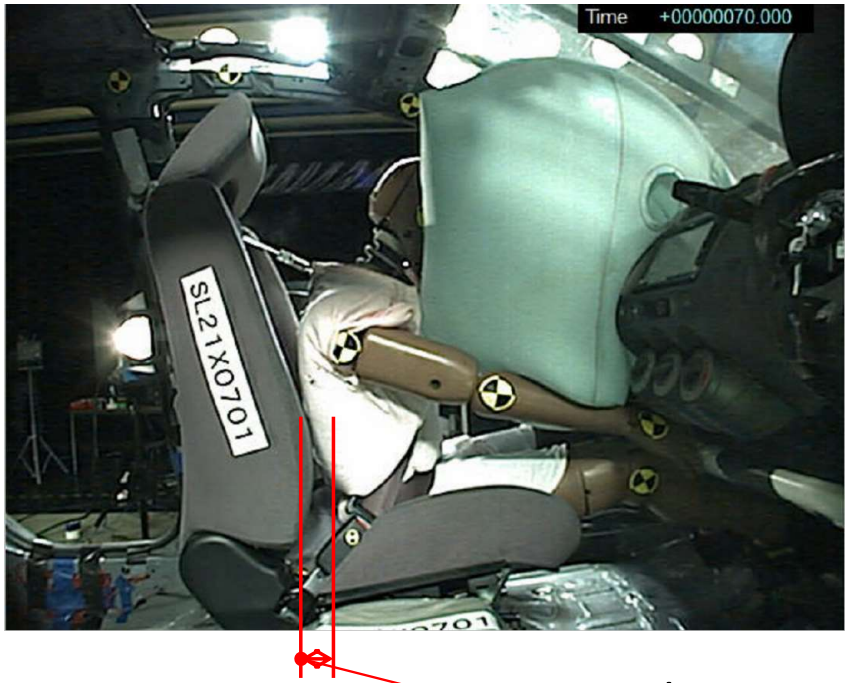
Acceleration pulse: vehicle acceleration in 50kph FWRB test

Rear Dummy



Move forward largely

Fr Dummy

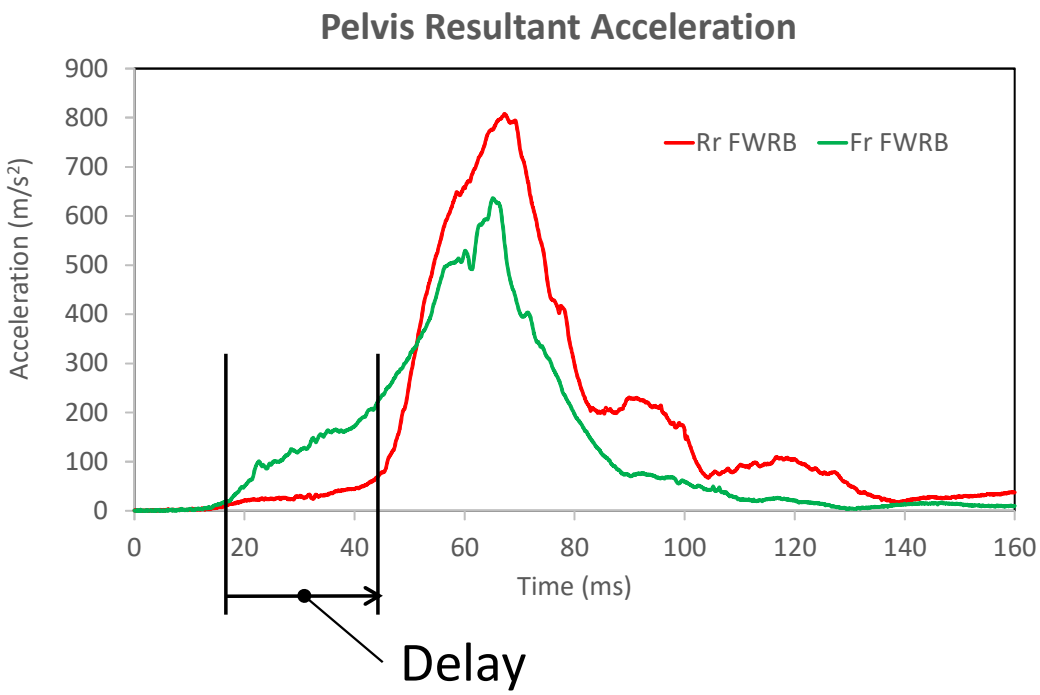


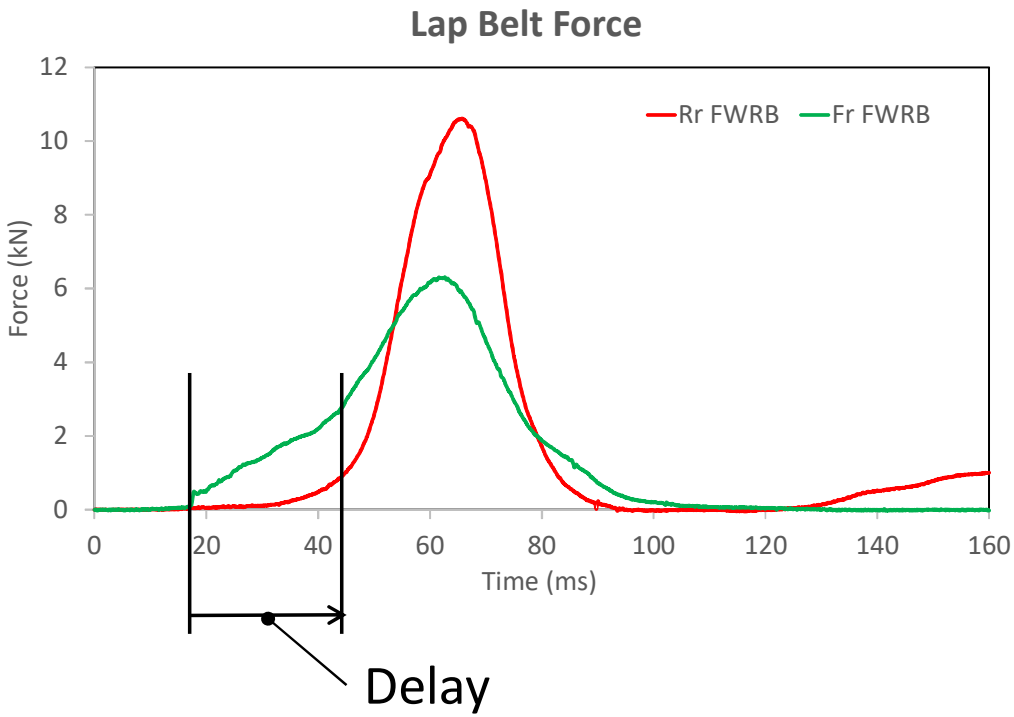
- The Rear dummy's pelvis moved forward larger than Front dummy's pelvis.

Comparison of the Measures of Front and Rear Dummy

Test conditions

Acceleration pulse: vehicle acceleration in 50kph FWRB test





- The increasing timing of the pelvis acceleration and lap belt force of rear dummy were later than those of the front dummy. The maximum values of pelvis acceleration and lap belt force of rear dummy were lager than those of front dummy.

Summary

- The injury measures of the AF05 dummy seated in rear seat with R129 test pulse were under the criteria of UN R137.
- The neck and chest injury measures of the AF05 dummy seated in rear seat with 50kph FWRB test pulse were over the criteria of UN R137. The force limiter and pre-tensioner were not equipped with rear seatbelt system.
- The injury measures of the AF05 dummy seated in front seat with 50kph FWRB test pulse were under the criteria of UN R137.
- **The Rear dummy's pelvis moved forward larger** than Front dummy's pelvis in 50kph FWRB test pulse case.
- **The increasing timing of the pelvis acceleration and lap belt force of rear dummy were later** than those of the front dummy in 50kph FWRB test pulse case.
- **The maximum values of pelvis acceleration and lap belt force of rear dummy were lager** than those of front dummy in 50kph FWRB test pulse case.
- It seems that **the slack of the seatbelt is not good for the occupant safety**.