

8th HR informal
07-08.12.2006

Dynamic test procedure for pre-crash head restraints

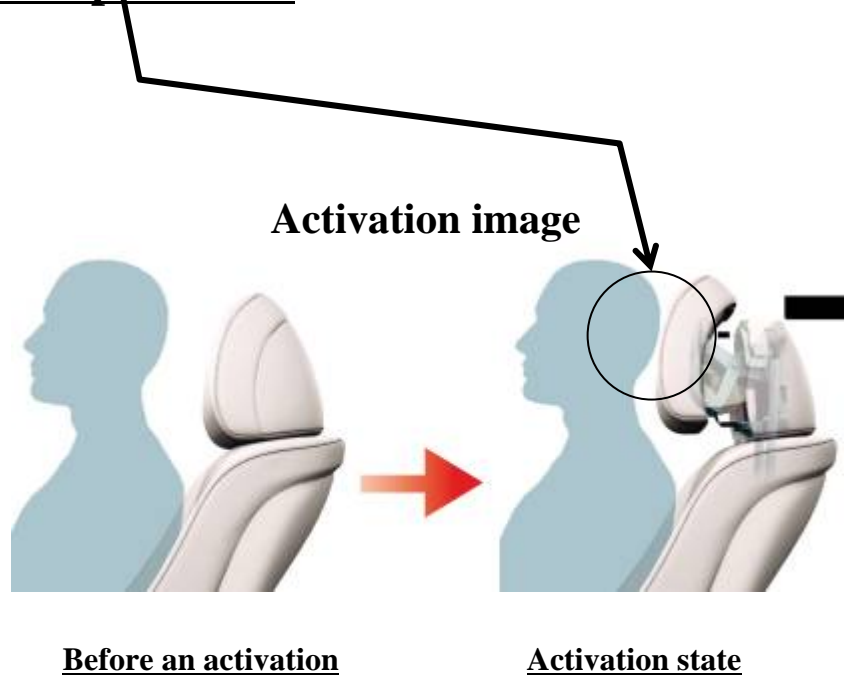
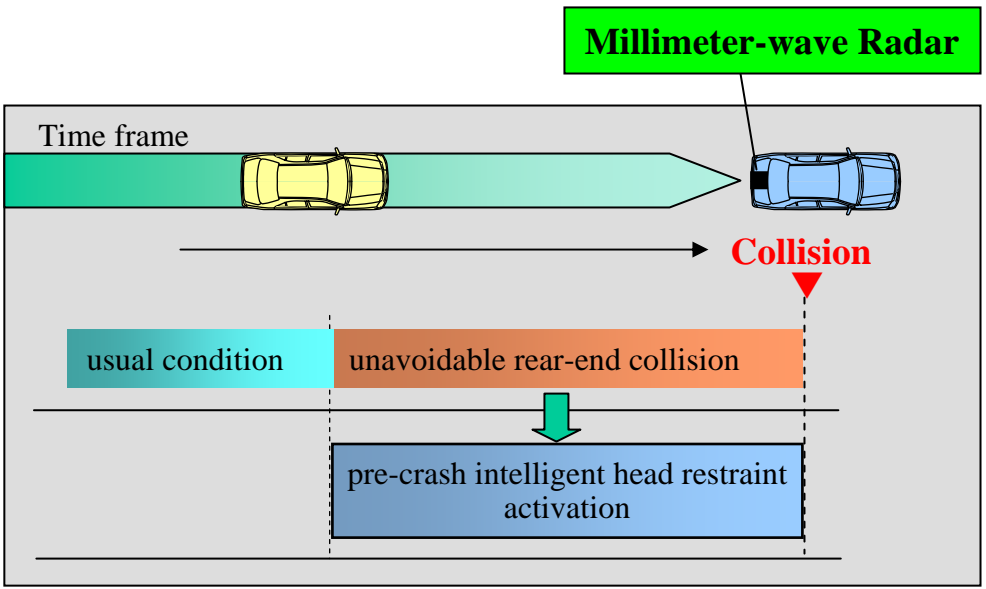
OICA (JAMA)

< The example of TOYOTA system >

1) Pre-Crash Intelligent Head Restraint Outline

Pre-crash intelligent head restraint will be ready to restrain the occupant head by moving Fr portion of head restraint forwards if the radar system detects unavoidable rear-end collision.

Pre-crash intelligent head restraint reduces the whiplash injury by reducing the gap between head restraint and occupant head.



< The example of TOYOTA system >

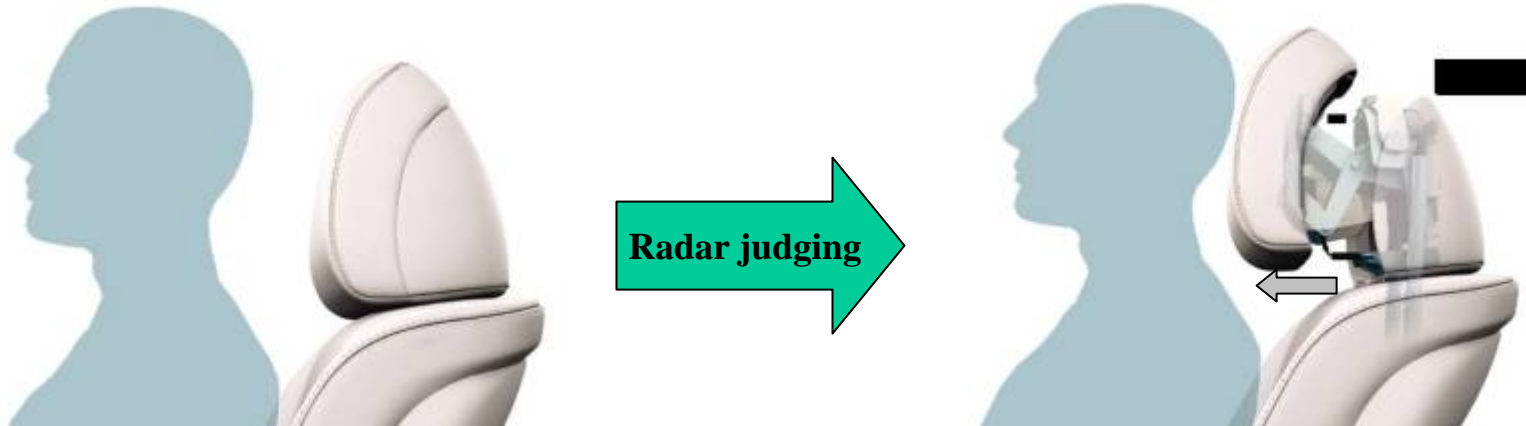
2) Explanation of Head Restraint activation

a) Judgment of the system activation and pre-crash intelligent head restraint mechanism.

If head restraint ECU receives the signal that shows unavoidable rear-end collision by a millimeter-wave radar system, the head restraint motor is activated and the front portion of head restraint is moved forward by the linkage mechanism.

b) Stop condition and keeping in position

The sensor implanted inside the head restraint detects occupant head position and head restraint stops just before the contact. Head restraint keeps in position until head restraint contacts occupant head by collision.



Before an activation

Activation state

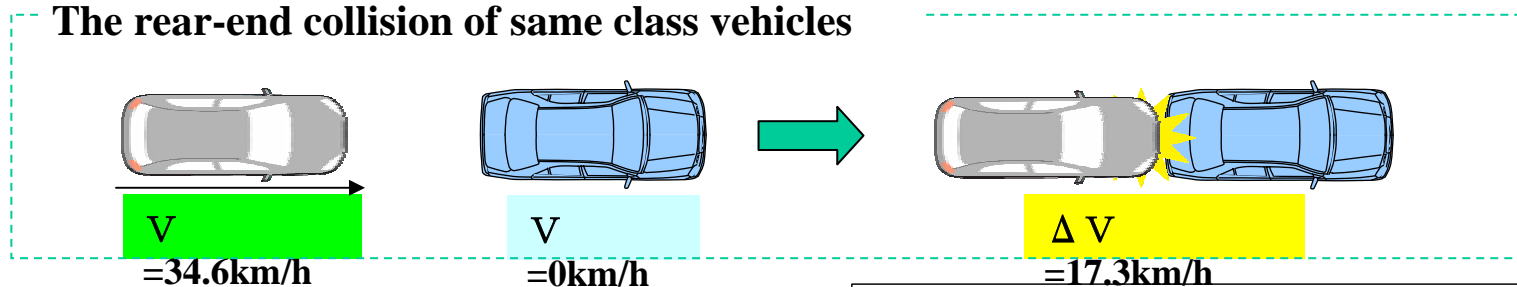
The proposal for Pre-Crush Head Restraints in GTR evaluation

• The sensing condition at dynamic test in head restraints GTR

1) The relative velocity between two same class vehicles in FMVSS202a condition (delta velocity 17.3km/h) is

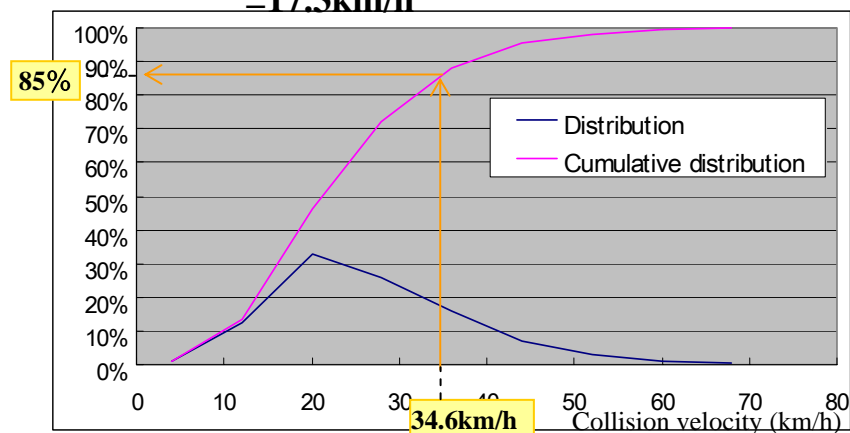
$$\rightarrow 17.3\text{km/h} \times 2 = \text{about } 35\text{km/h}$$

The rear-end collision of same class vehicles



2) The relative velocity of 35km/h covers 85% of the rear-end collisions in real world accident.

1990 Rear-end collision data of vehicle in West Germany
<Exhibition> IROCBI conference Spt 1998
Reported soft tissue neck injuries after rear-end car collisions



The Pre-Crash sensing condition at dynamic test procedure in Head Restraints GTR should be check at 35km/h (relative velocity).

• The head restraints position at dynamic test in head restraints GTR

The head restraints position at dynamic test should be simulated the situation at head restraints contact time in rear-end collision above.

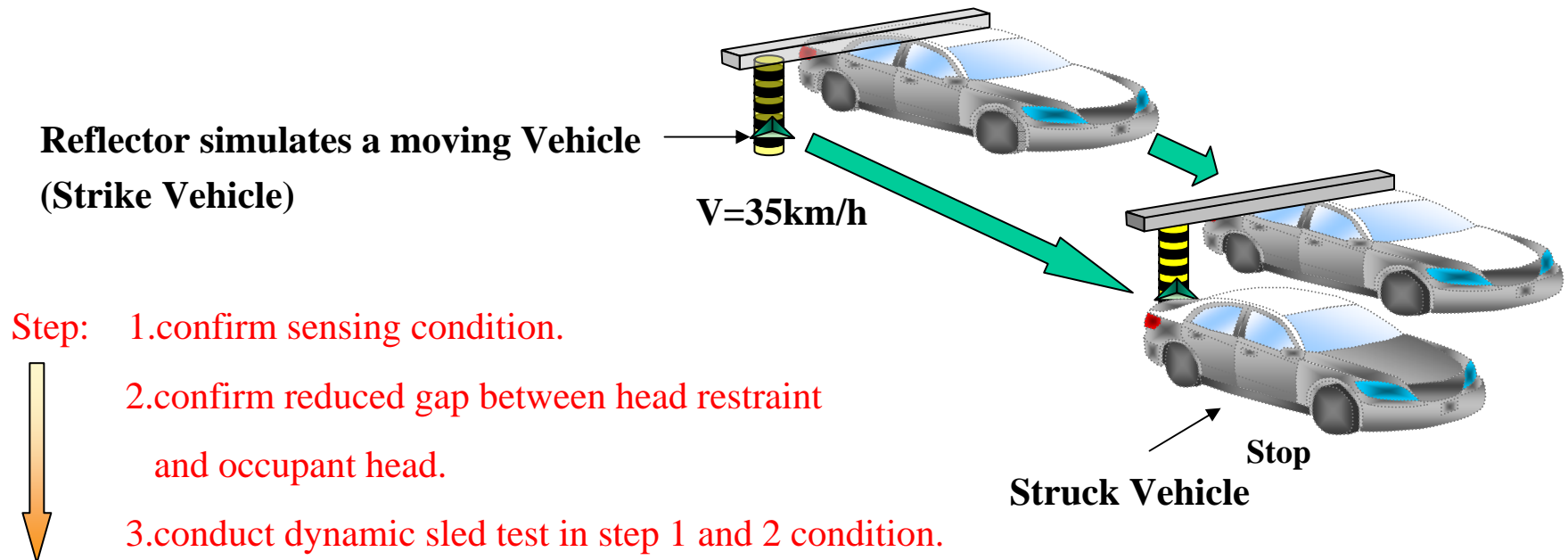
The proposal at the dynamic test procedure for head restraints with Pre-Crash sensing function

The dynamic test procedure should simulate sensing condition(*1) and head restraints position (*1) in rear-end collision at relative velocity 35 km/h.

(※ It should be explained by each manufacturer
1) :

Example of confirmation method of sensing condition and head restraint position

Sensing condition and head restraints position can be confirmed by the contact of pole and reflector which simulates bullet vehicle.



Proposal for active and pre-crash head restraints in dynamic test procedure

(modification of BMW's proposal at 7th HR GTR meeting)

- Dynamic test procedure according to FMVSS 202a with battery installed and ignition “ON”; (Airbag system operable)
- Usage of trigger point and head restraints position for active and pre-crash head restraints in dynamic test procedure according to FMVSS 202a on request of the vehicle manufacturer;
- Vehicle specific trigger point and head restraints position according to manufacturer's information;
- Manufacturer must provide data of a standardized barrier test (rear end collision) with energy level (Δv 17.3 km/h) of FMVSS 202a pulse; (for Active HRs)

or

Manufacturer must provide data that the dynamic test procedure simulate sensing condition and head restraints position in rear-end collision at Δv 17.3 km/h (vehicle velocity 35 km/h); (for pre-crash HRs)

the END

Thank you for your attention !