Japan Automobile Standards Internationalization Center

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(44th GRSP, 10-12 Dec 2008,
agenda item 12b))

Proposal for ECE R17-08 Dynamic Backset Option with BioRID II

JASIC/Japan

Dec. 2008

Backset Requirements in Head restraint gtr phase1

Japan Automobile Standards Internationalization Center

Head Restraint gtr, WP29/2008/54 and /55, was agreed at #144 WP29 in March. '08,

Static

H-point with Backset ≤ 55mm

Contracting Parties may allow manufacturers to choose

R-point with Backset ≤ 45mm

OR*

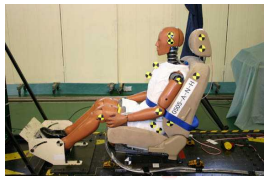
Dynamic Option

Contracting Parties choice

HY-III

Head rotation ≤ 12 deg

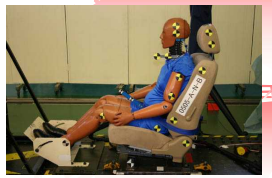
HIC ≤ 500



OR

Some criteria with BioRID II

Until BioRID II requirements are included in this gtr or adopted in the national regulation of a Contracting Party, head restraints shall comply with any or all static requirements.

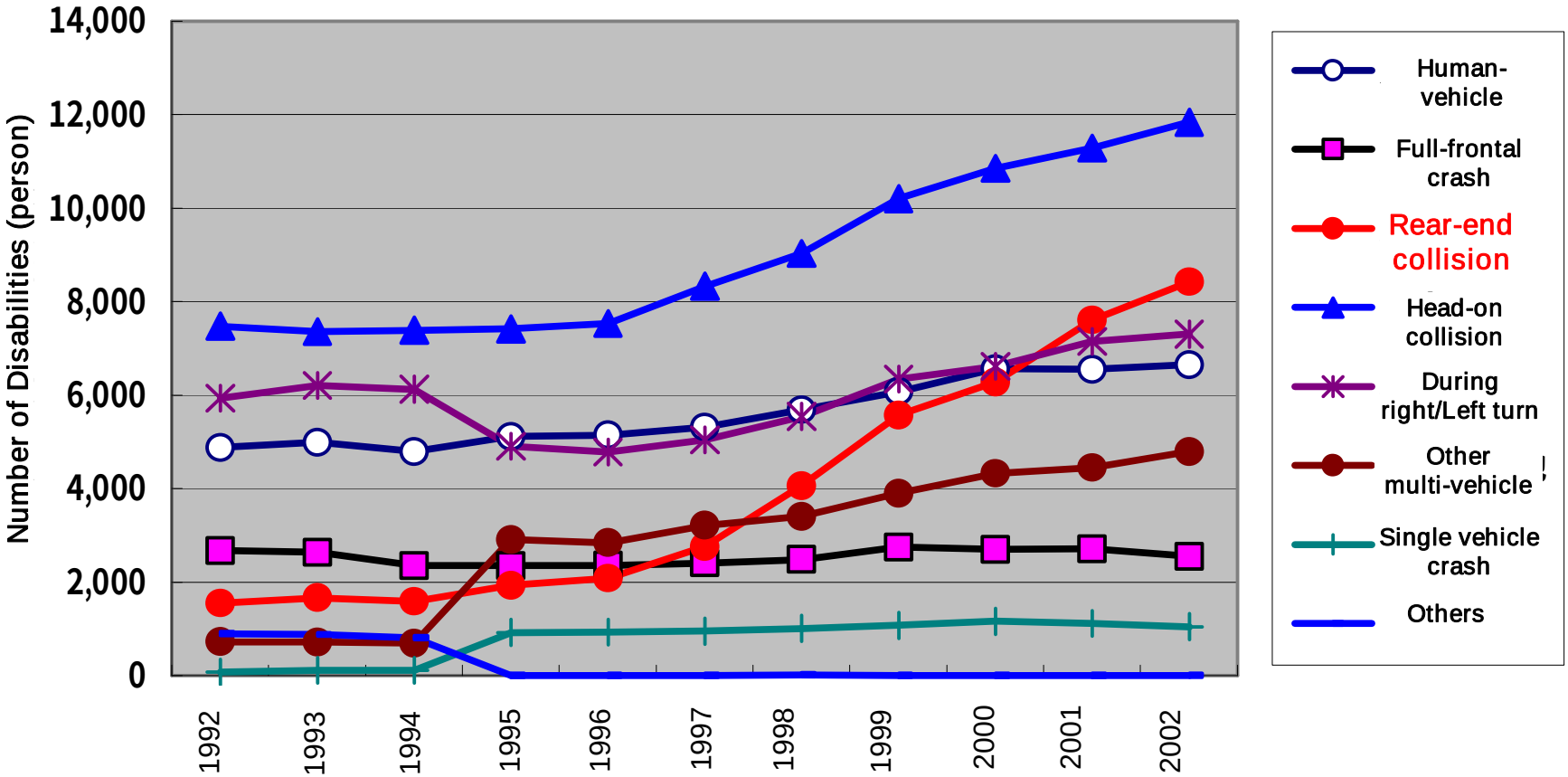


*: Manufacture's choice

Motivation of this Amendment proposal

The number of permanent disabilities due to rear-end collisions have been significantly increasing in Japan.

The countermeasure should be effective and quick.



Yearly Change in the Number of permanent Disabilities by Accident Type in Japan (Total Disabilities in 1992-2002)

3

Motivation of this Amendment proposal

ECE R17-08 series amendment, GRSP/2008/11 has been proposed as follows.

Static

H-point with Backset < 55mm

ma

R-

Dynamic Option

BioRID II requirement
[Reserved for future use when dummy and criteria are agreed.]

Active or reactive head restraints are not required to comply with Backset requirements.

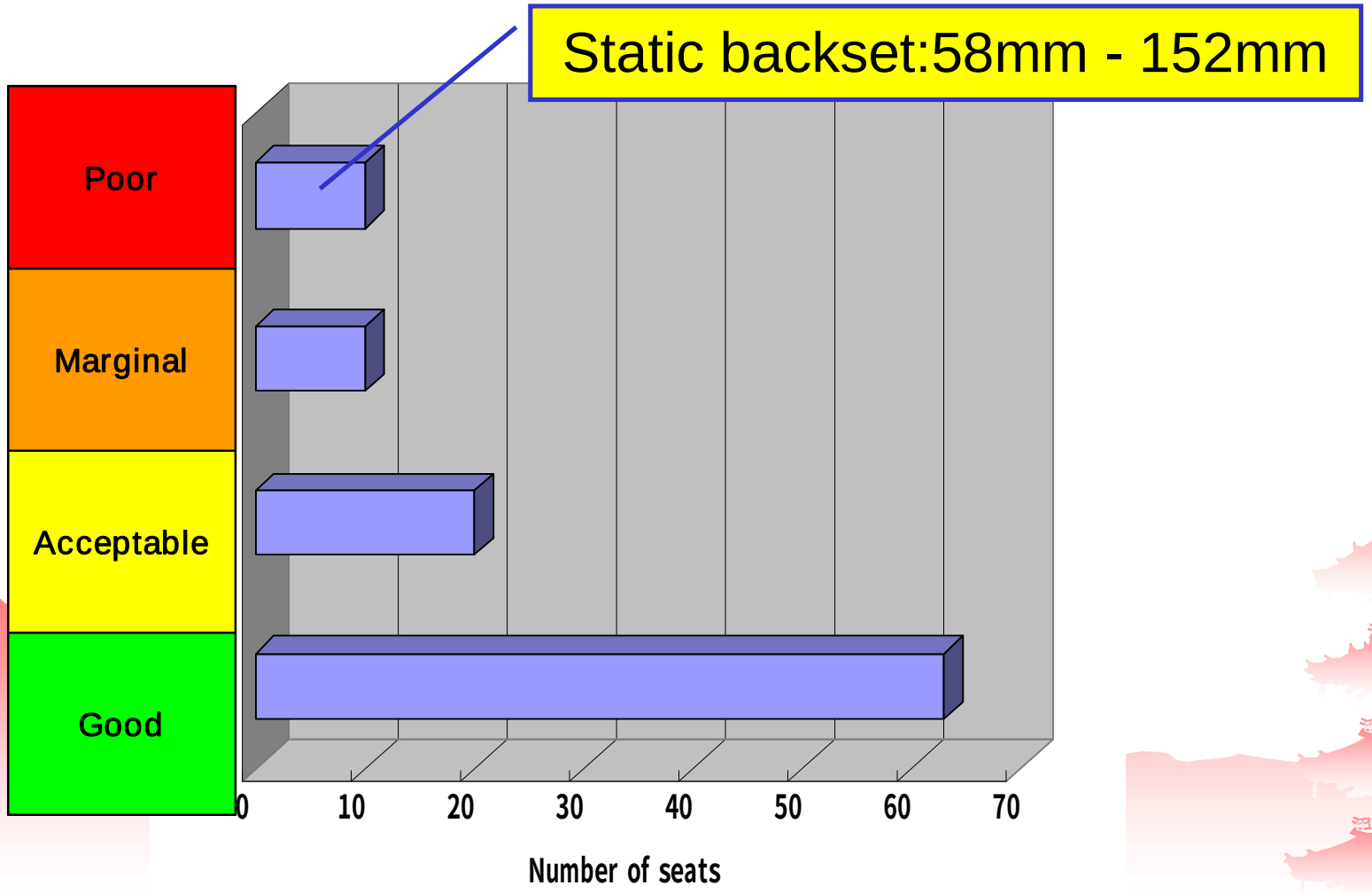
Japan would like to propose Bio RID II requirement because of following reasons.

-to assure active or reactive head restraints performance.
-to avoid active, reactive and pre-active definition trouble and design restriction.
-to provide equal dynamic option opportunity for all seat types.

*: Manufacture's choice

Motivation of this Amendment proposal

Performance level of reactive head restraints are not always GOOD according to IIHS test results. “Poor” ranking seats are out of static backset requirement.



Condition of Dynamic Test for gtr phase1

- Dynamic test for Head restraint gtr Phase1 should be an alternative test for static Backset, and had better to equivalent to static backset.
- It is considered to evaluate following phase I stage of whiplash phenomenon.

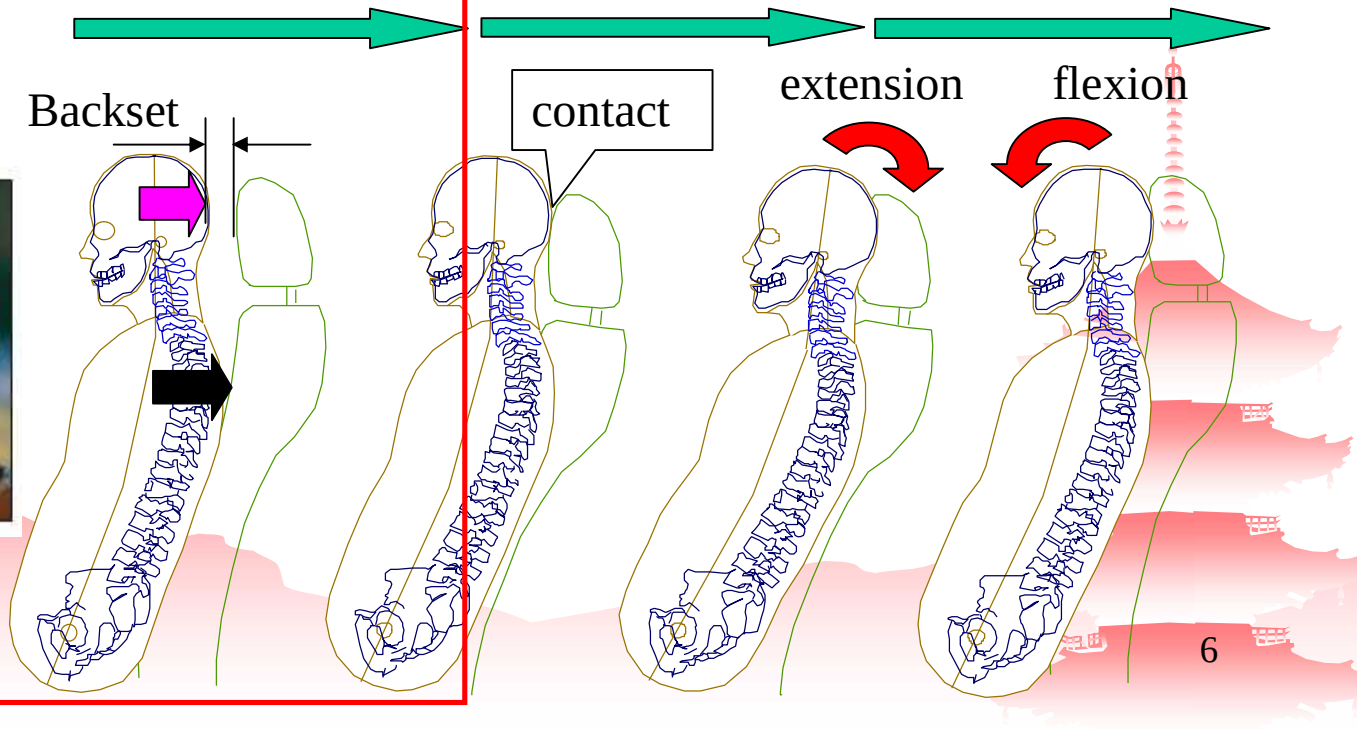
Whiplash Phenomenon

gtr Phase1

Phase I: Before Head/Head restraint contact

Phase II: After Head/Head restraint contact

Phase III: Rebound

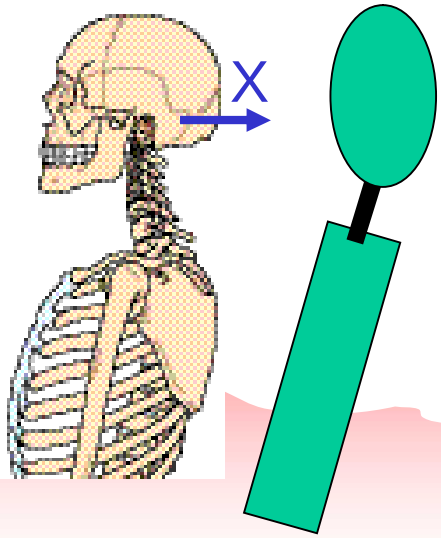


Condition of Dynamic Test for gtr phase 1

- BioRID II is promising with its high biofidelity to the human body, but still need to study injury criteria indicators, reference values, test pulse, etc. for appropriate dynamic test as we propose as in phase 2 activity.
- EEVC WG20 and Japan have recognized that a Geometrical indicator of BioRID II is feasible now.

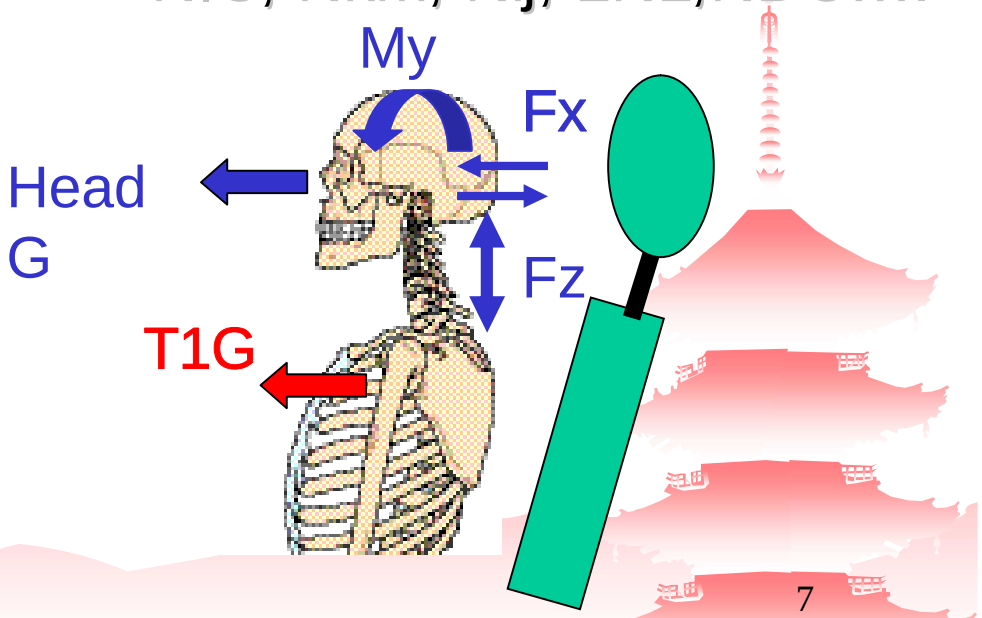
Phase1

Geometric indicator



Phase2

NIC, Nkm, Nij, LNL,NDC….



Proposal for Dynamic Test for ECE R17-08

The head O.C. (Occipital Condyle) x-axis displacement with respect to T1 was proposed as a candidate of geometric indicator from the result of EEVC WG12 and Japan (JARI) joint assessment of Rear Impact Dummy Biofidelity.

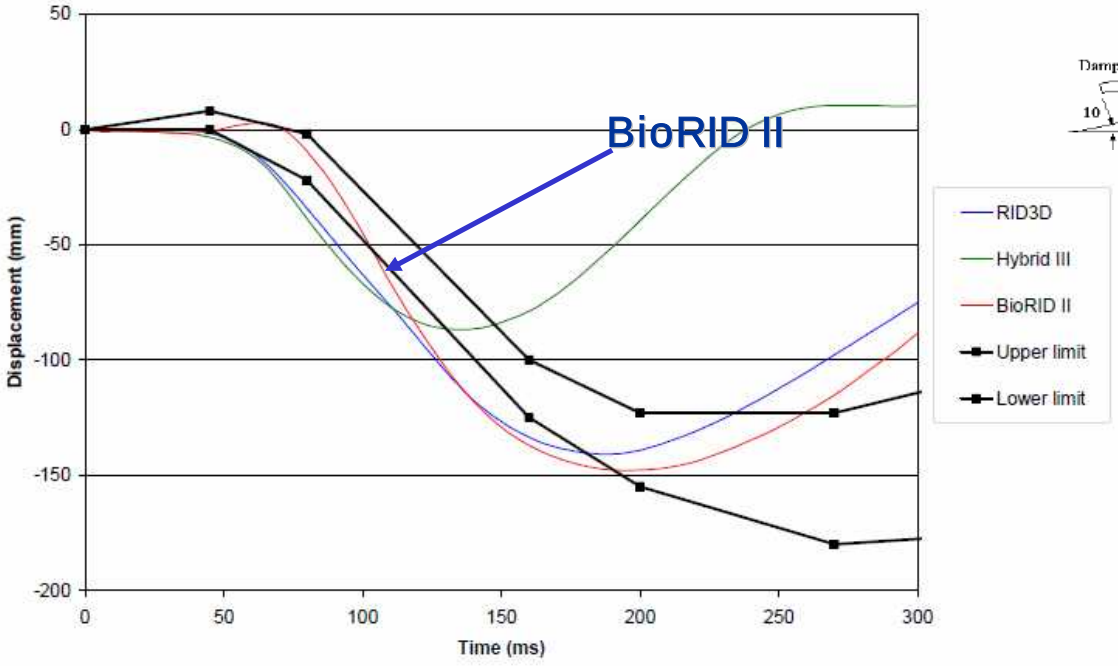
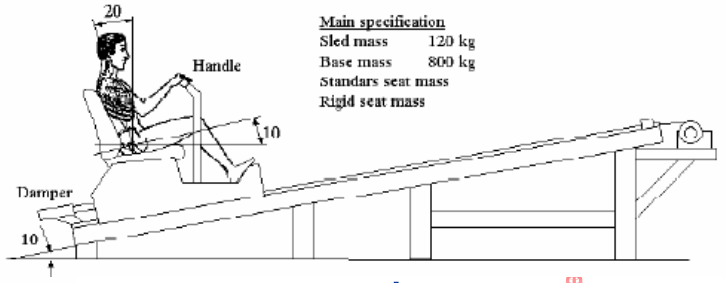
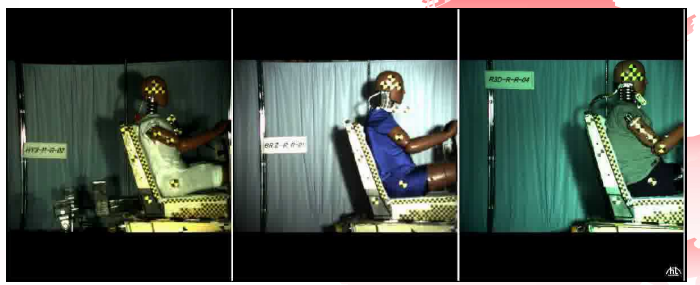


Figure 3.18: Head x-axis displacement with respect to T1 (JARI Testing)



Volunteer

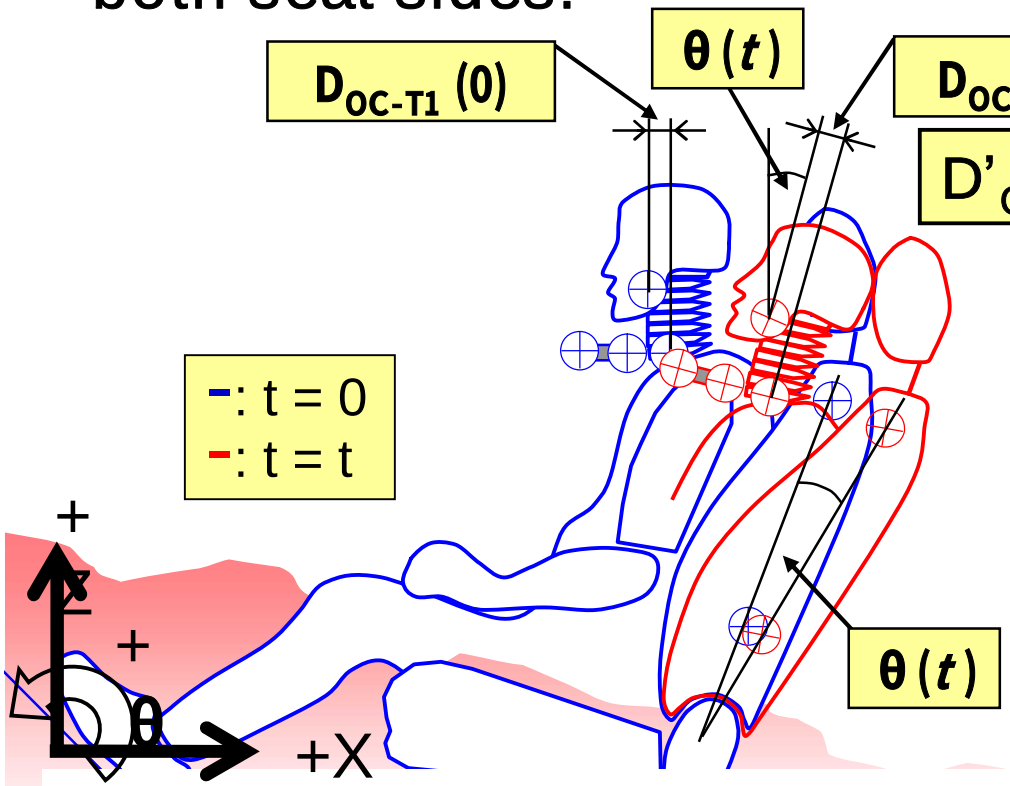
Hybrid-III BioRID II RID3D



Proposal for Dynamic Test for ECE R17-08

Definition of Dynamic Backset

Dynamic backset , maximum OC-T1 relative displacement, shall be calculated as the maximum absolute value of $D'_{OC\text{-}T1(t)}$, whichever is larger between both seat sides.



$$D'_{OC\text{-}T1}(t) = D_{OC\text{-}T1}(t) - D_{OC\text{-}T1}(0)$$

$$D_{OC\text{-}T1}(t) = OC_{SBL}X'(t) - T1_{SBL}X'(t)$$

$$OC_{SBL}X'(t) = OC_{SBL}X\cos\theta'(t) + OC_{SBL}Z\sin\theta'(t)$$

$$T1_{SBL}X'(t) = T1_{SBL}X\cos\theta'(t) + T1_{SBL}Z\sin\theta'(t)$$

$$\theta'(t) = \theta(t) - \theta_{initial}$$

$$OC_{SBL}(X(t), Z(t)) = OC(X(t), Z(t)) - SBL(X(t), Z(t))$$

$$T1_{SBL}(X(t), Z(t)) = T1(X(t), Z(t)) - SBL(X(t), Z(t))$$

$$\theta(t) = \tan^{-1}\frac{SBU(Z(t)) - SBL(Z(t))}{SBU(X(t)) - SBL(X(t))}$$

Note: The measurements data shall be considered for evaluation until the point in time at which the head rebounds from the head restraint or at 300 ms after T-zero, whichever occurs first.