

Transmitted by the expert from Japan

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(43rd GRSP, 19-23 May 2008
agenda item 15(b))

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

JASiC/Japan

May 2008



Backset Requirements in Head restraint gtr phase1

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

Static

H-point with Backset $\leq 55\text{mm}$



Contracting Parties may allow manufacturers to choose

R-point with Backset $\leq 45\text{mm}$



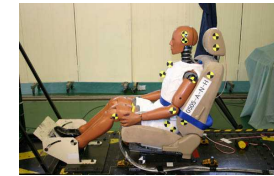
Dynamic Option

Contracting Parties choice

HY-III

Head rotation $\leq 12\text{ deg}$

HIC ≤ 500



OR*

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

Amendment ECE/TRANS/WP.29/GRSP/2008/11

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

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.

Dynamic Option

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

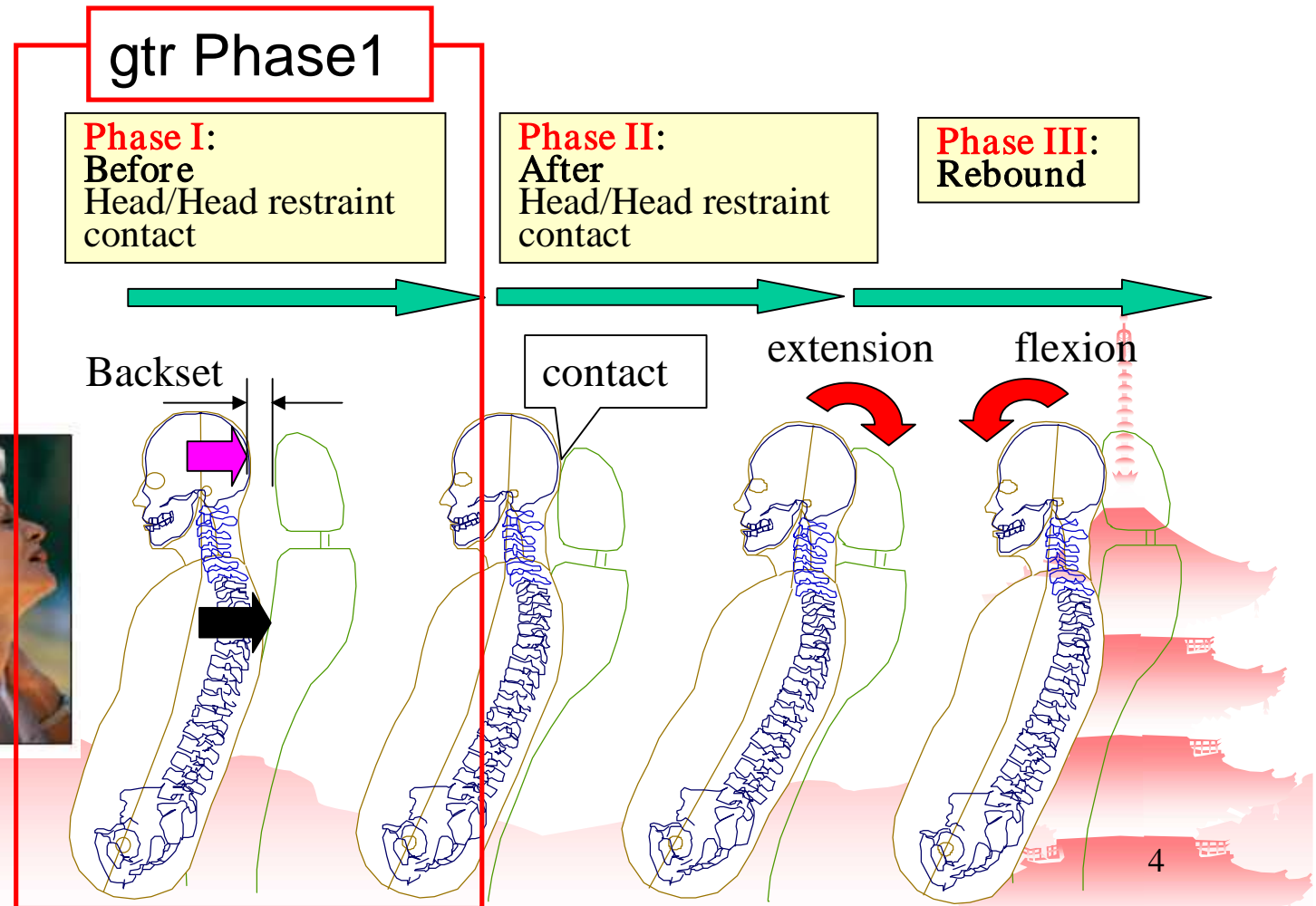
Active or reactive head restraints are not required to comply with Backset requirements.

*: **Manufacture's choice**

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

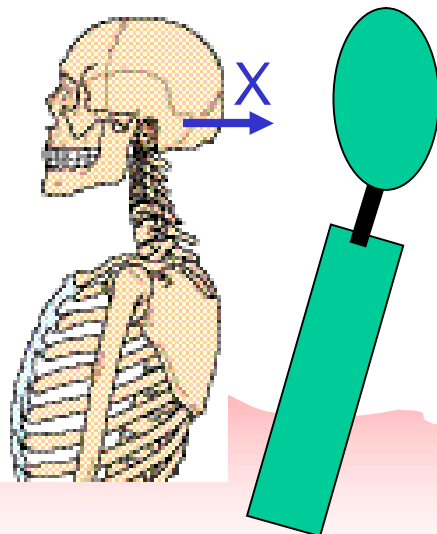


Condition of Dynamic Test for gtr phase 1

- 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.

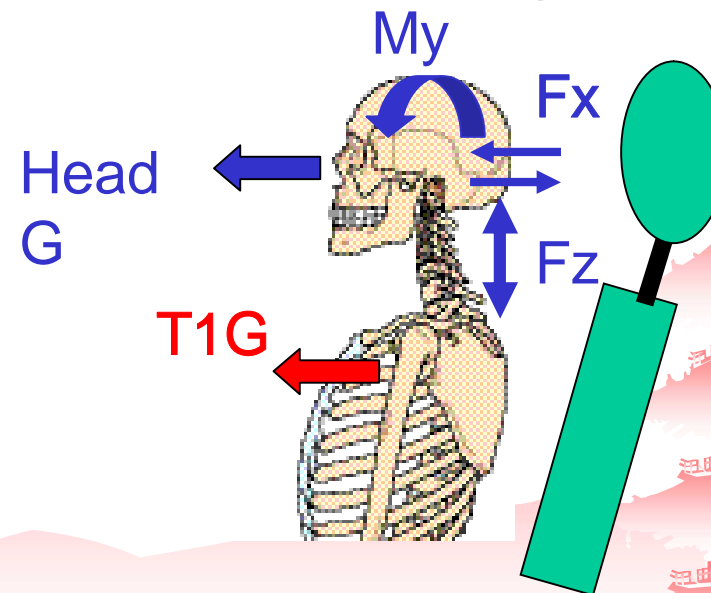
Phase1

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.

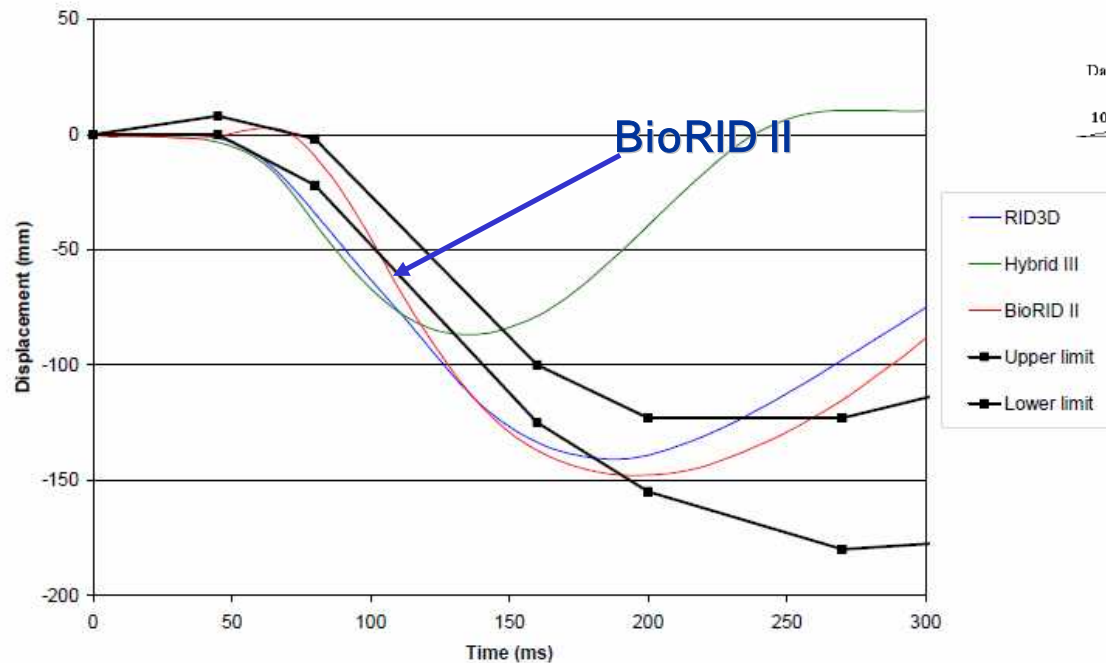
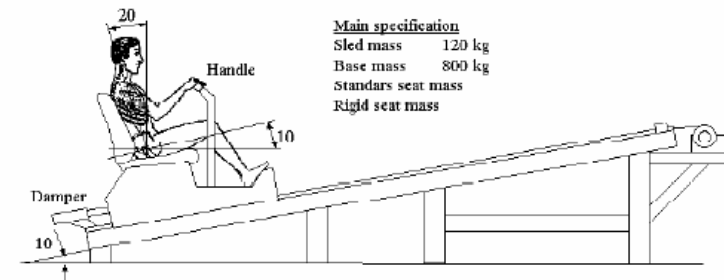


Figure 3.18: Head x-axis displacement with respect to T1 (JARI Testing)



Main specification
 Sled mass 120 kg
 Base mass 800 kg
 Standard seat mass
 Rigid seat mass



Hybrid-III BioRID II RID3D

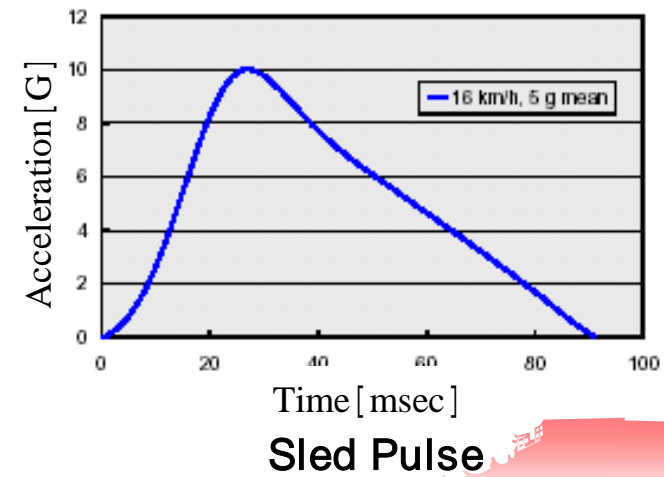
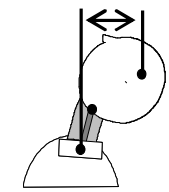
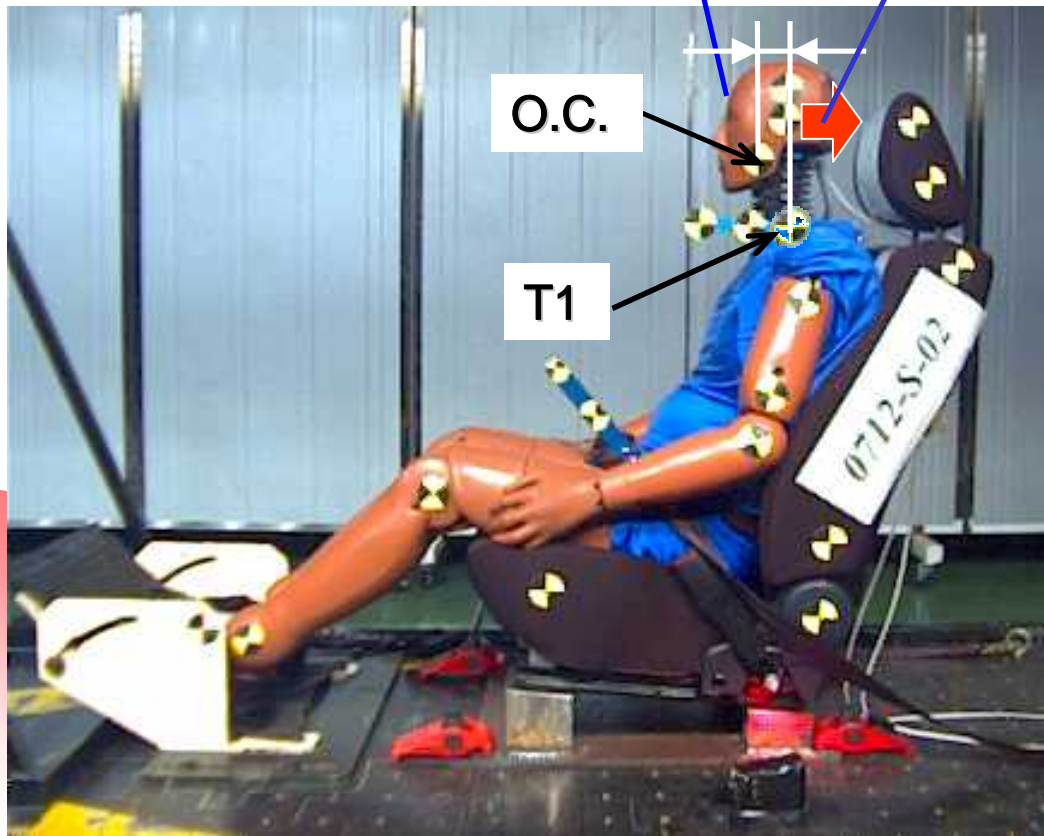


Proposal for Dynamic Test for ECE R17-08

Max. Head O.C. Movement feasibility study

:Set BioRID II with equivalent distance as R-point static backset

:Measure the Max. O.C. Movement relative to T1 [Dynamic backset]

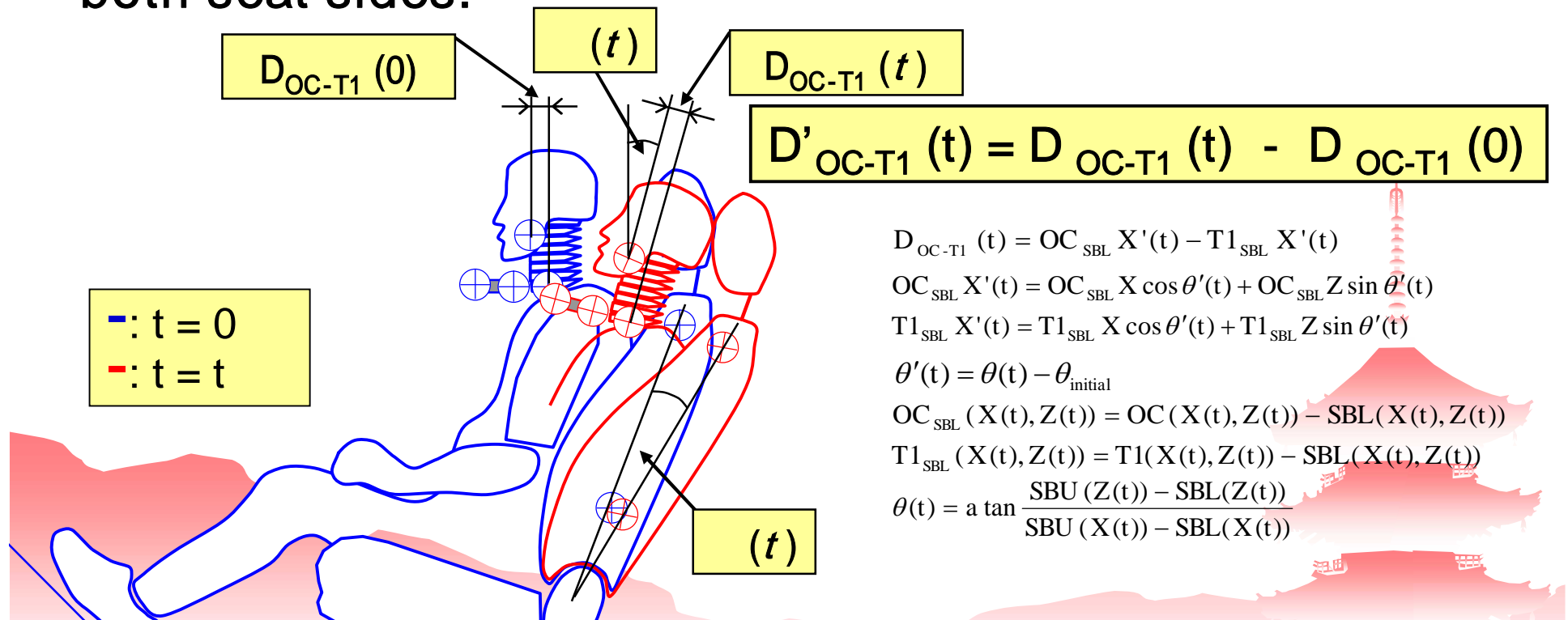


- Head O.C. (Occipital Condyle)
- Head C.G. (Centre of Gravity)

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 $D'_{OC-T1}(t)$, whichever is larger between both seat sides.



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.

Tested seats

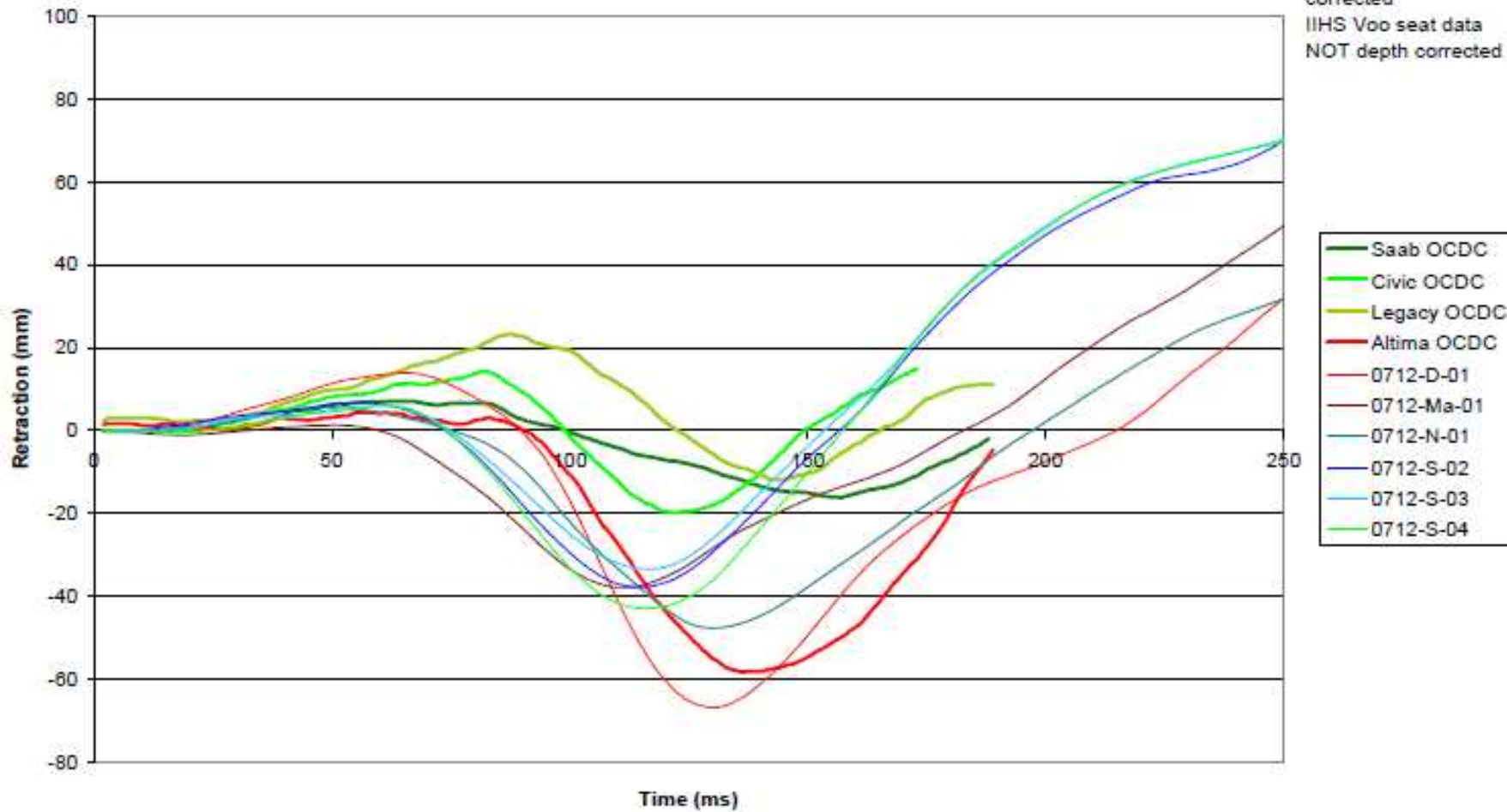
18 seats were tested at 6 different laboratories in cooperation with EEVC WG20.

IHS Ranking	Seat Type	Number (*:EEVC data)
Good	Normal	4
	Reactive	2(3*)
	Passive	2
	WHIPS	(1*)
Acceptable	Normal	1
	Reactive	(1*)
	Passive	2
Marginal	Normal	1
	Reactive	1
Total		18

Dynamic Backset test examples

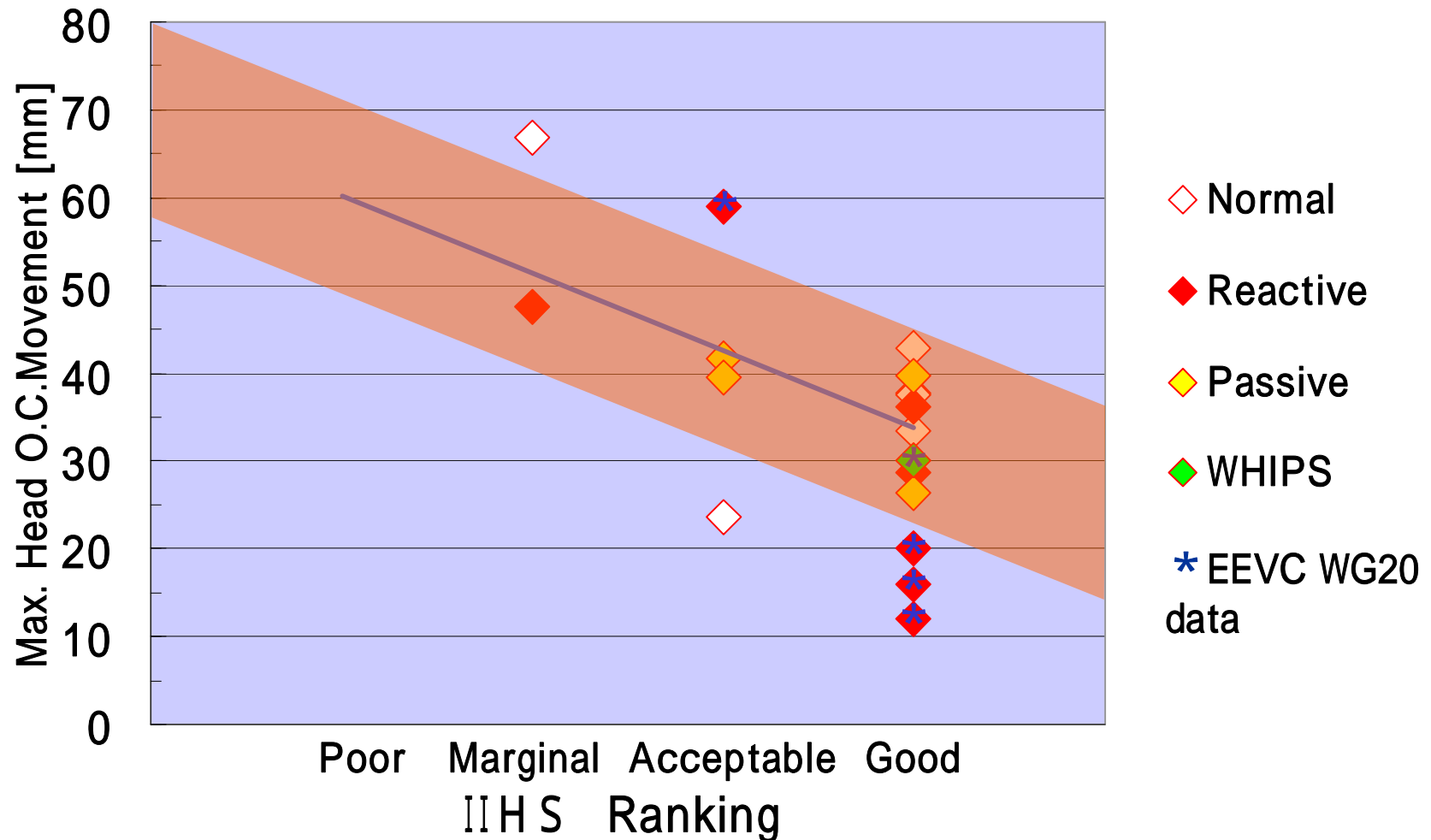
Dynamic backset examples

Note:
JASiC data depth corrected
IIHS Voo seat data NOT depth corrected



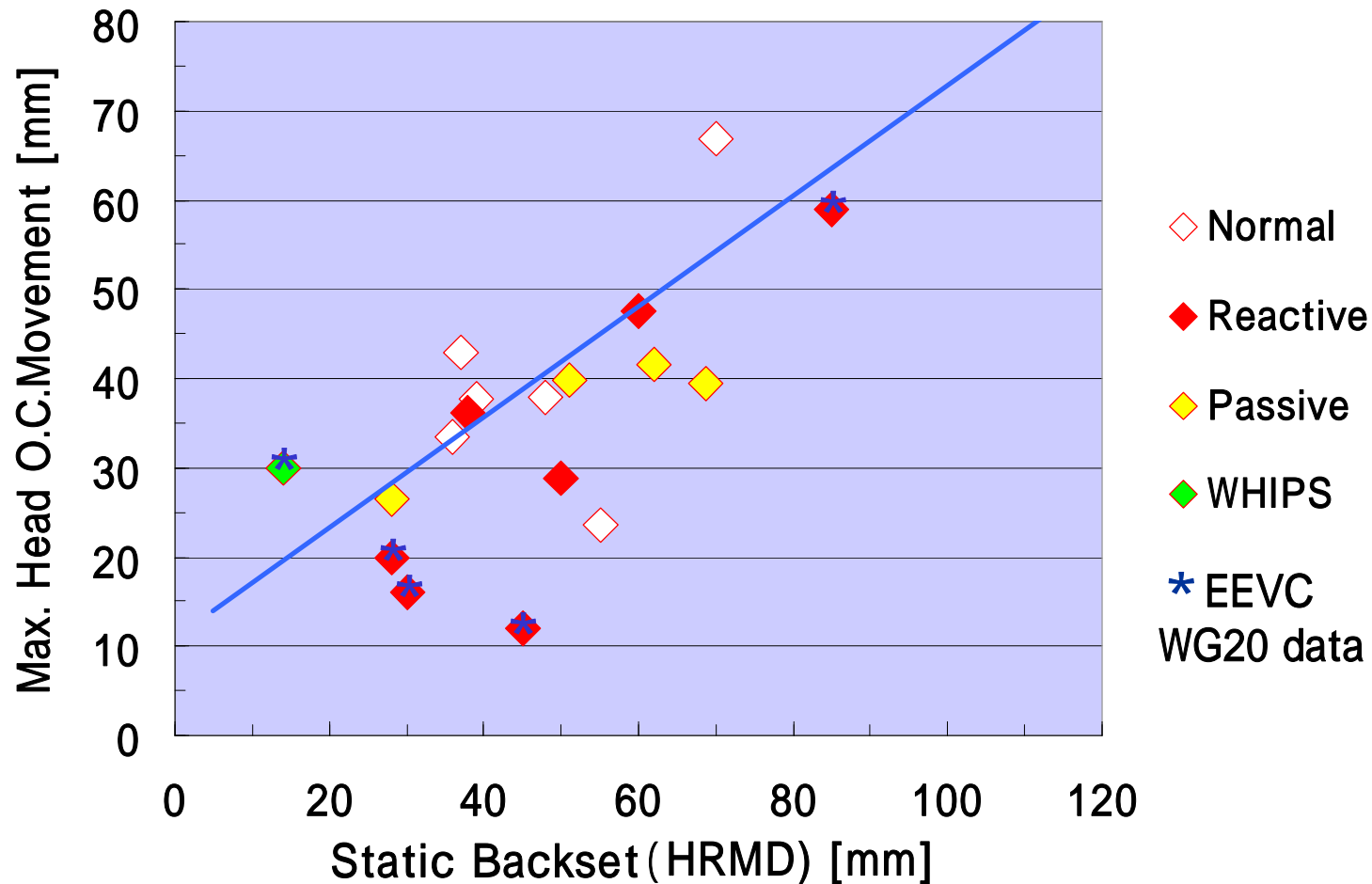
Comparison between IIWPG Rating and Dynamic backset

Dynamic backset has shown better correlation with IIWPG rating.



Comparison between Static Backset and Dynamic Backset

Dynamic Backset also have correlation between normal seat static backset, and show the effect of reactive, passive and WHIPS type seats.



Repeatability Evaluation

◆ Test method

The repeatability of following indicators were evaluated by 3 seats about one seat type.

- Dynamic backset (Head O.C. -T1), Fx, My, etc.

◆ Method of evaluation

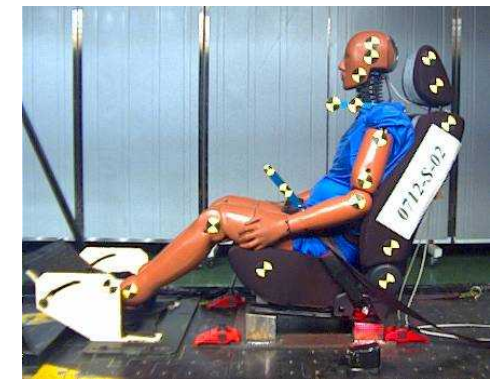
Comparison of coefficient of variation (CV)

$$\text{Repeatability C.V} = \frac{S_d}{\bar{X}} \quad 100 (\%)$$

\bar{X} = Mean value of each indicator maximum value

S_d = Standard deviation of each indicator maximum value

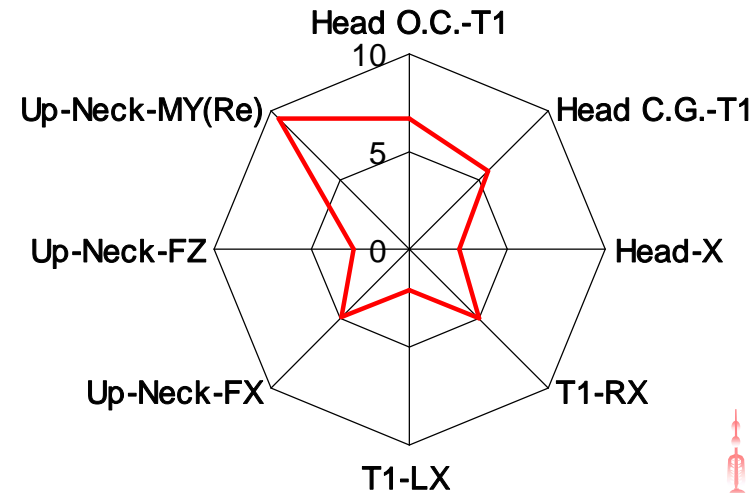
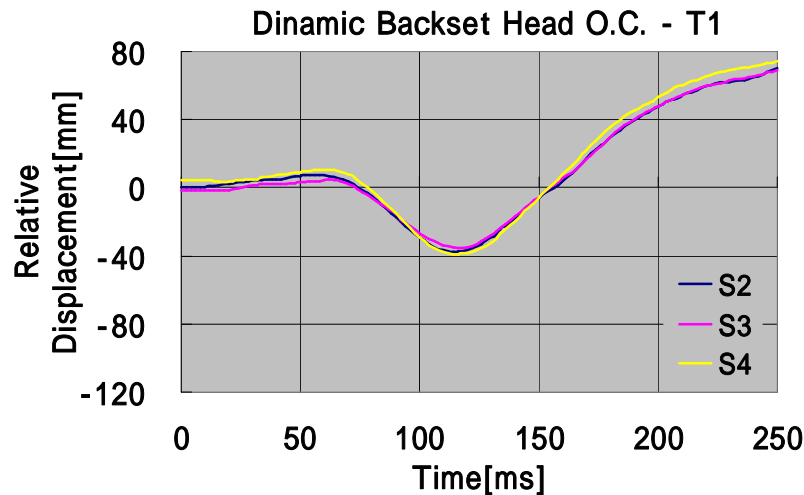
◆ Criteria Admissible level: CV 10



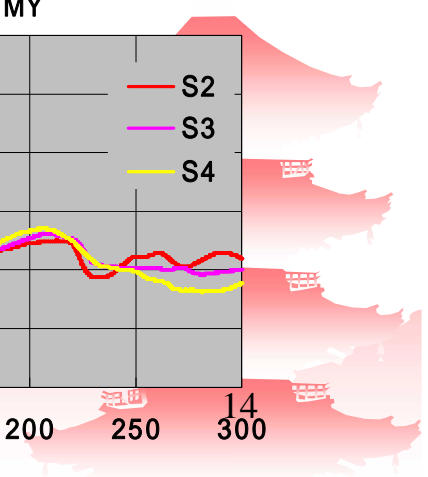
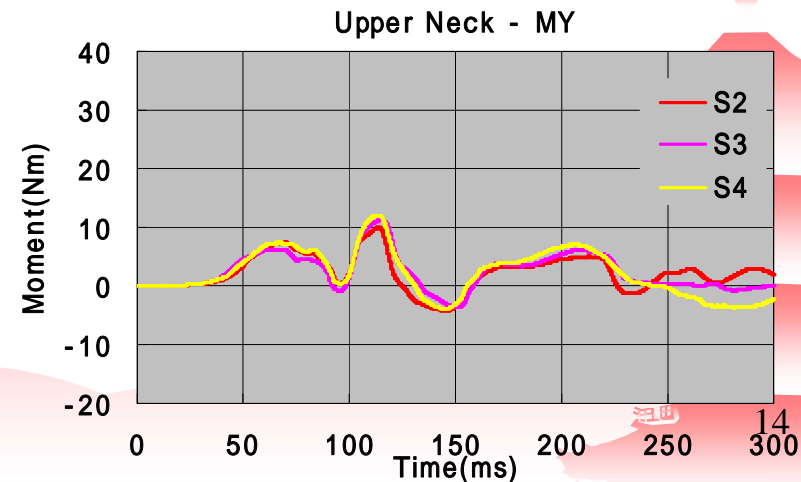
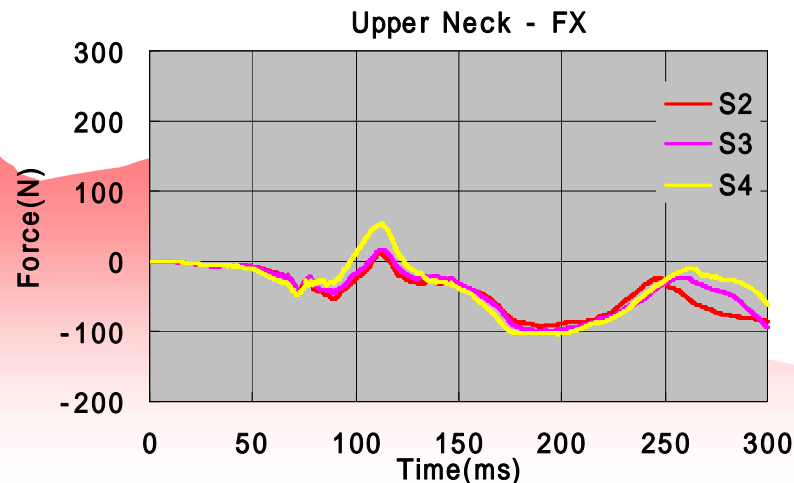
BioRID-II

Repeatability Evaluation

Dynamic backset and other indicators show acceptable level of repeatability C.V.

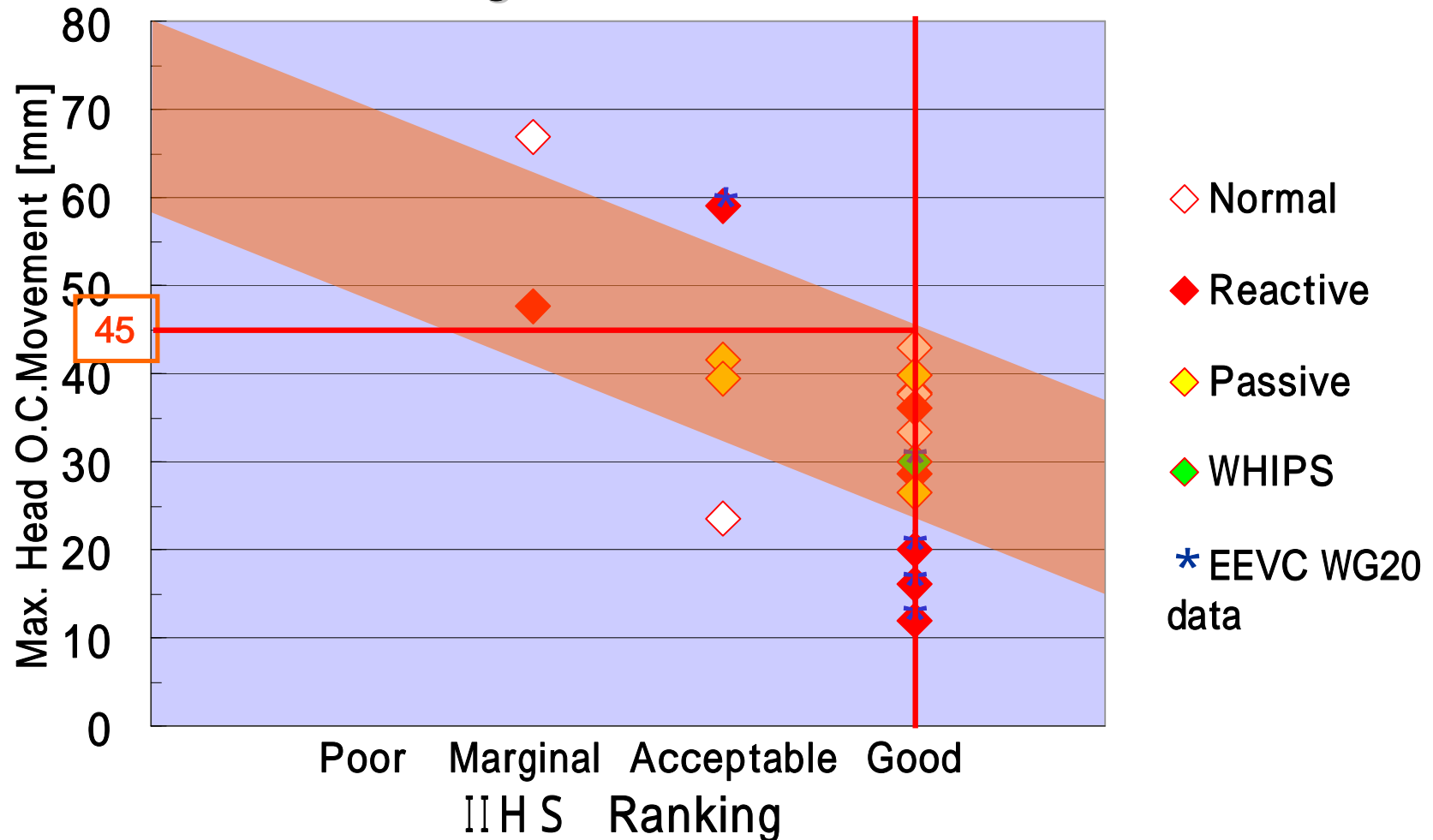


Fx and Upper neck MY show slight variation.



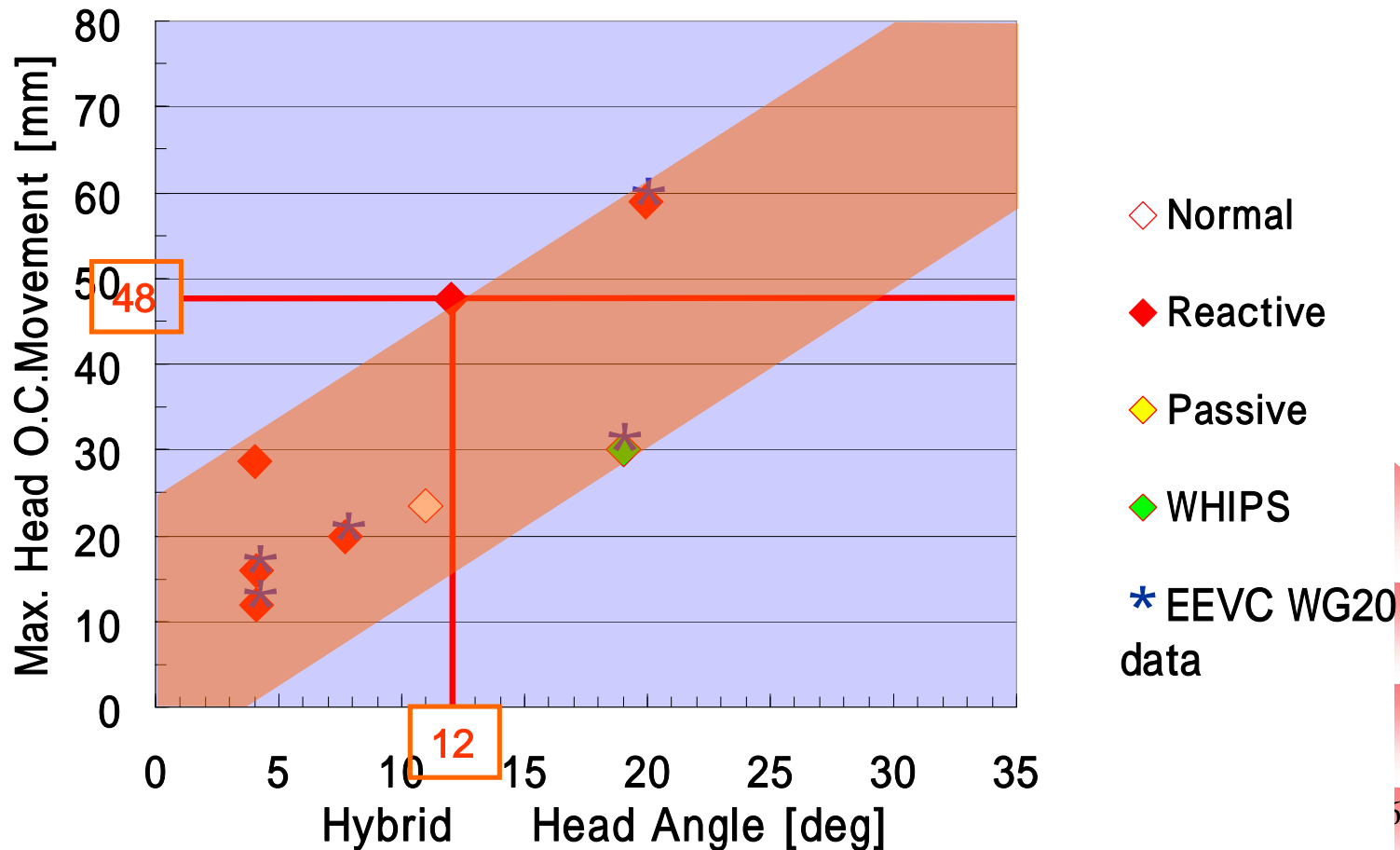
Threshold study

Dynamic backset threshold is tentatively proposed $\leq [45\text{mm}]$ as a minimum performance level to achieve IIWPG “GOOD” rating.



Threshold study

Dynamic backset threshold is tentatively proposed $\leq[48\text{mm}]$ as a equal level to achieve 12 degree head rotation angle with Hybrid III.



Conclusion

◆ Dynamic backset (Maximum x displacement of Head O.C.- T1) is considered as a reasonable dynamic geometric indicator for BioRID II for following reasons.

- ✓ Correlation with IIWPG dynamic evaluation.
- ✓ Reflection of reactive, passive type seats effect.
- ✓ Reasonable repeatability

◆ Dynamic backset threshold is tentatively proposed as a minimum performance level to achieve IIWPG “GOOD” rating and equivalent level for Hybrid III head rotation requirement.

Dynamic backset $\leq [48]$ mm

Thank You



FMVSS 202a (HY-III) vs IIWPG (BioRID-II) Evaluations

