Comment to the new French Dynamic Backset Proposal

JAPAN/ MLIT

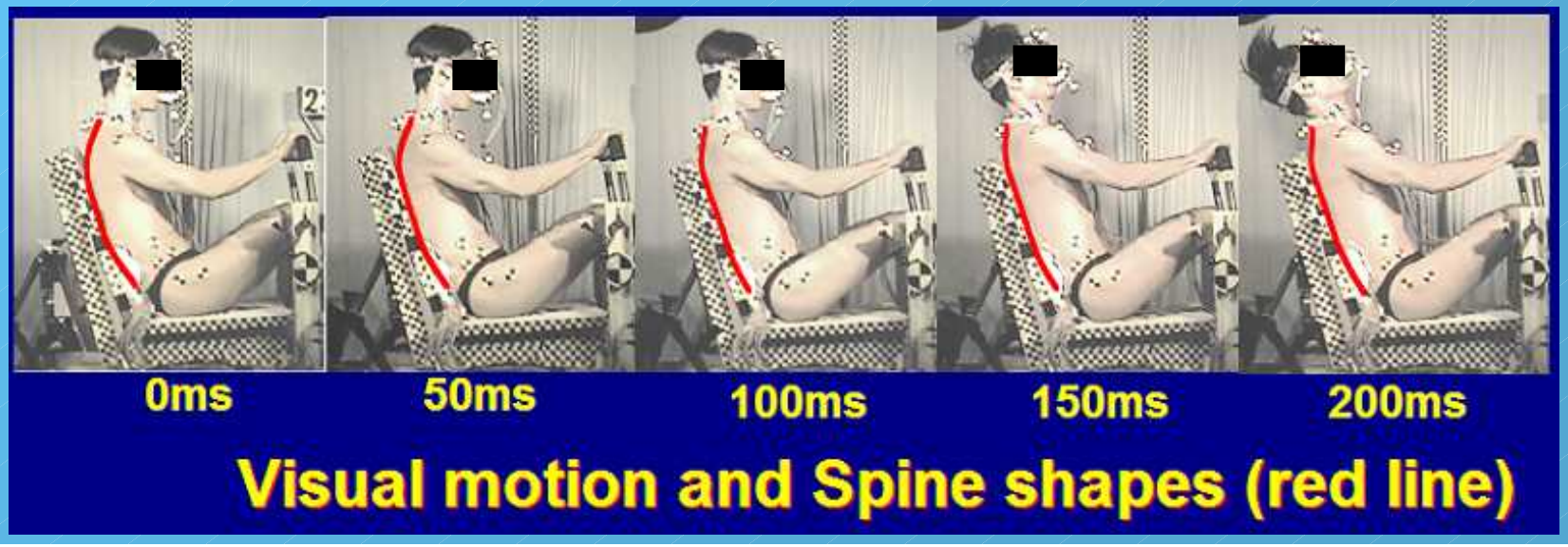
September 2006

1. Required Features of the evaluation method

(1) Provide a test/assessment method (with an assessment dummy, criteria, limit values) that reflects the whiplash phenomenon.

(2) The method should have high reproducibility and repeatability.

(3) The method should be fair to many kind of seat types.



2. Discussion issues for the Dynamic Backset

(1) Whiplash Phenomenon & Assessment Criteria

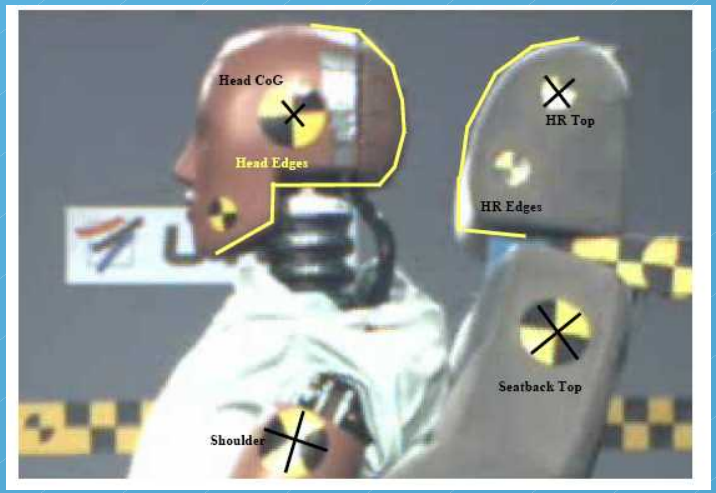
(2) Validity for Whiplash Injury Assessment Index

(3) Reproducibility and Repeatability
  (a) Assessment Dummy
  (b) Measurement Method

(4) Fairness to many kind of seat types

(5) Summary of Subject

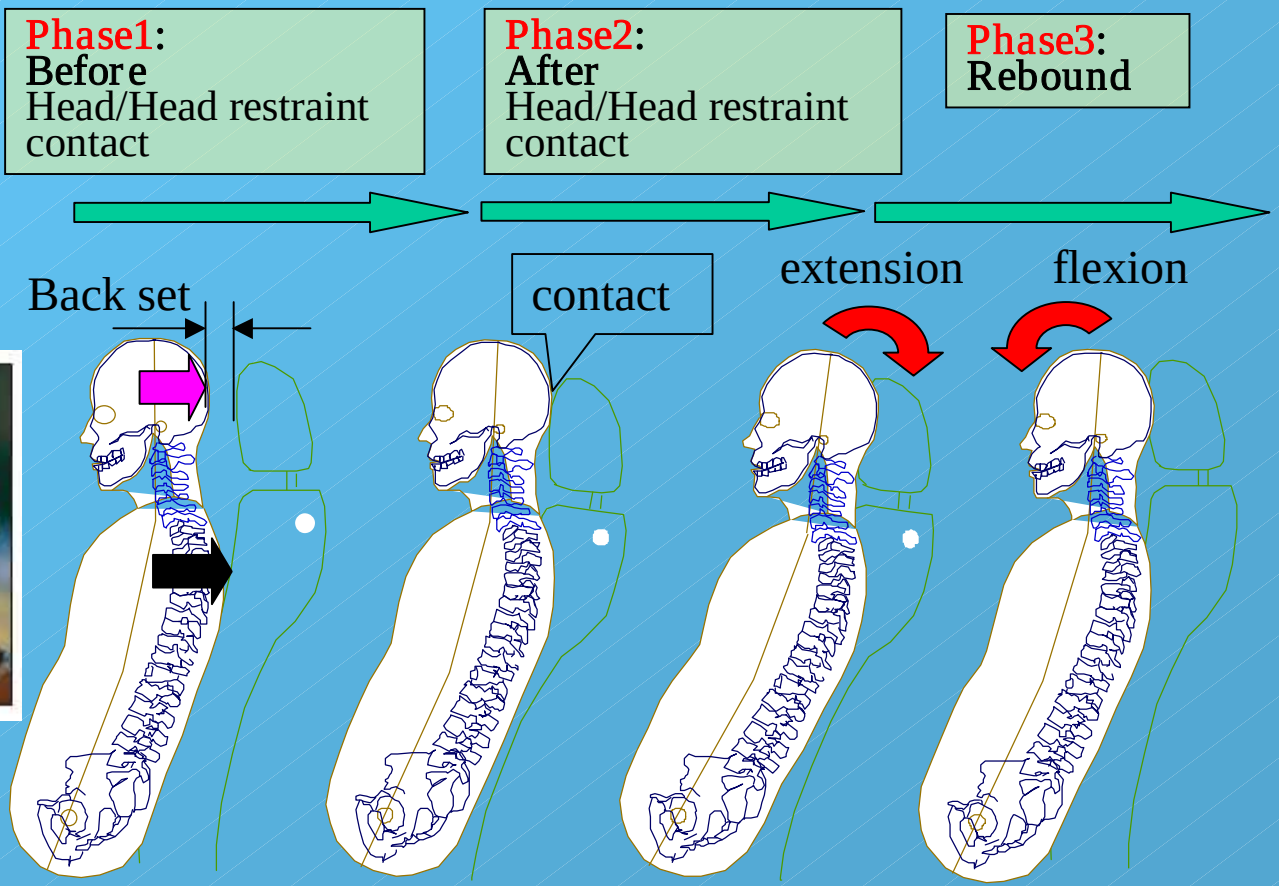
(6) Proposal



(1) Whiplash Phenomenon & Assessment Criteria

Phase 1:
Phase 2:
Phase 3:
} ⇒ Should be evaluated

Whiplash Phenomenon



(2) Validity for Whiplash Injury Assessment Index

(a) Need to examine the relative horizontal motion of the neck.

⇒ There is a possibility to represent by using the dynamic backset.

(b) Able to determine the load on the neck by measuring the force and moment on the upper and lower parts of the neck.

⇒ Impossible to measure by using the dynamic backset.

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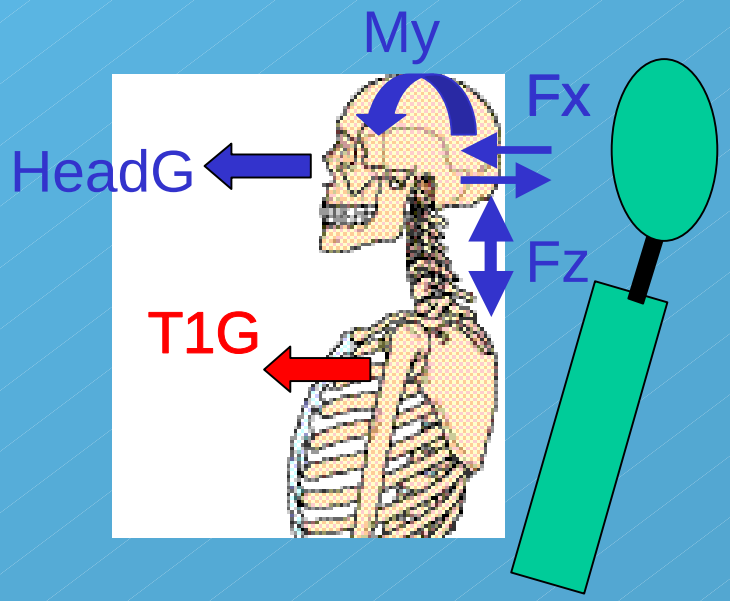


(3) Reproducibility and Repeatability

Cited from presentation material for 5th GTR Meeting

(a) Assessment Dummy

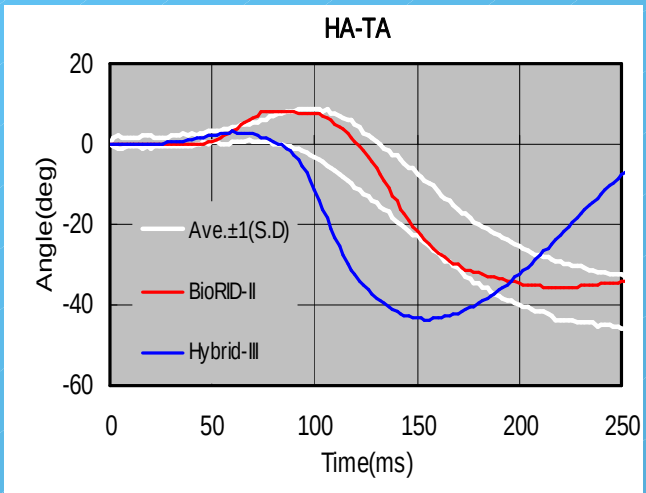
<Hybrid-III>

- Poor biomechanical responses
- Good repeatability and reproducibility

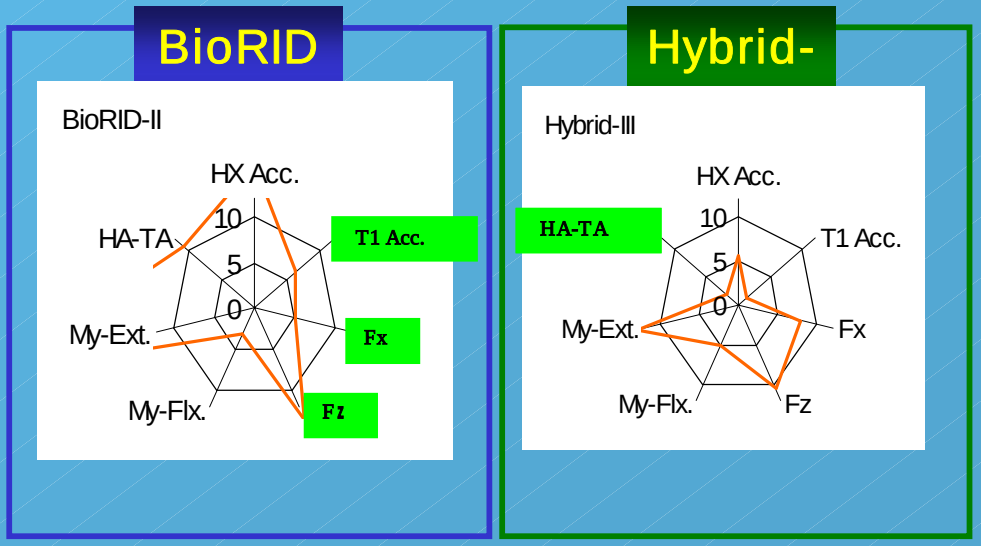
<BioRID-II>

- Better biofidelity than Hybrid-III
- Acceptable repeatability
- To improve reproducibility, define detail calibration method (T1 Locater Fix Bolt's torque should be considered etc.) and by authorizing it in ISO or SAE etc.

BIOFIDELITY



REPEATBILITY

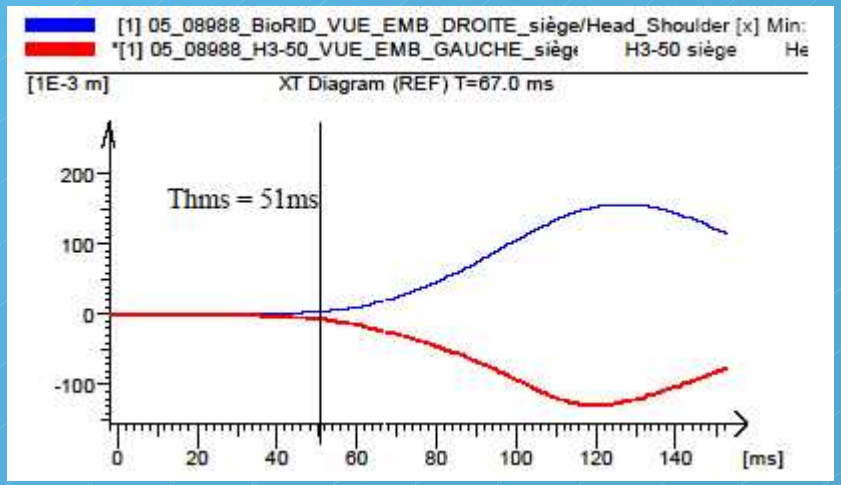


(b) Measurement Method

- Definition of the Time of Head Motion need to for Dynamic Backset is not clear and accurate.

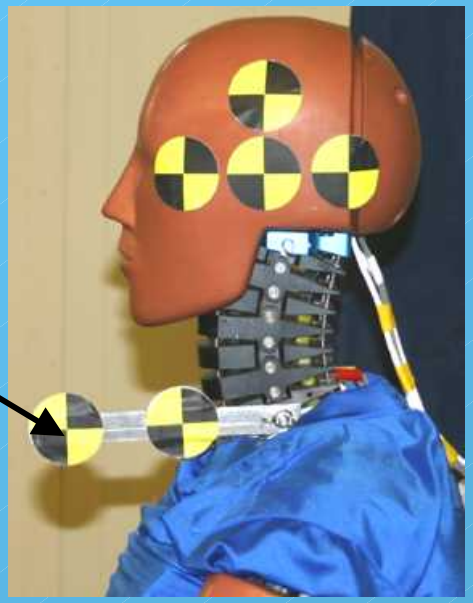
(Video analyses small variation makes effect of dynamic backset value.)

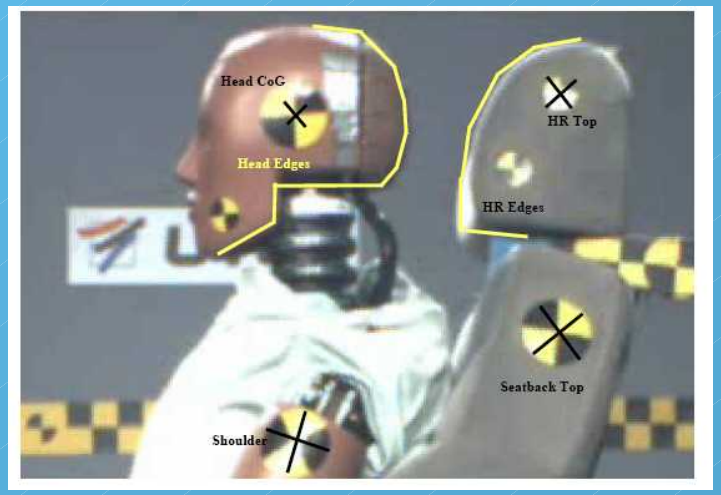
- Determine the Time of Head Motion relatively to the Shoulder (Thms). To consider only timing during which shearing of the neck occurred (considered to be dangerous) and to be incentive for foam deformation systems (toyota avensis) or structural one (whips)



- The analysis position of the dummy torso should not be on the shoulders but on T1 equipped with a fixing bar.
  (As BioRID-II's shoulders are simply attached to the skin covering the torso, the freedom of motion is excessive for the shoulders.)

T1 Locater

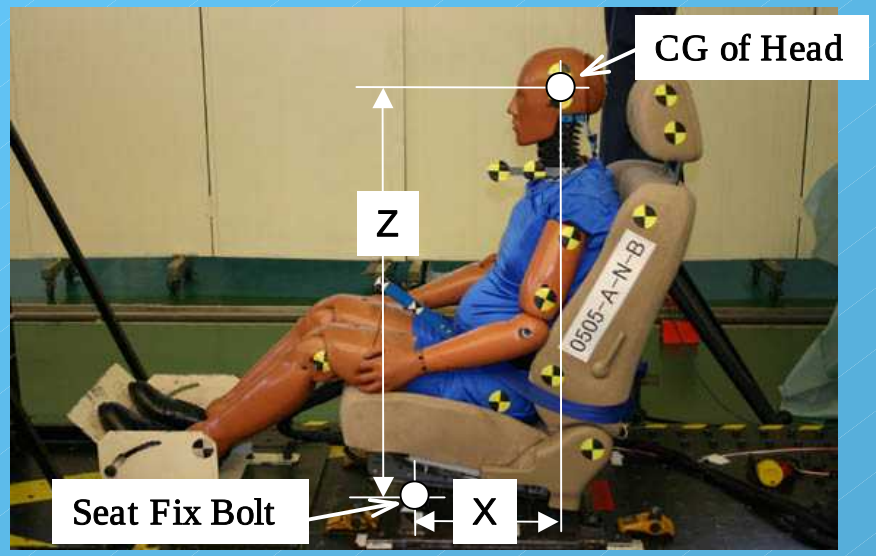




(c) Issues on Dummy Setting

Large head position variations during dummy setting have been observed, depending heavily on testing personnel factors and seat design factors.

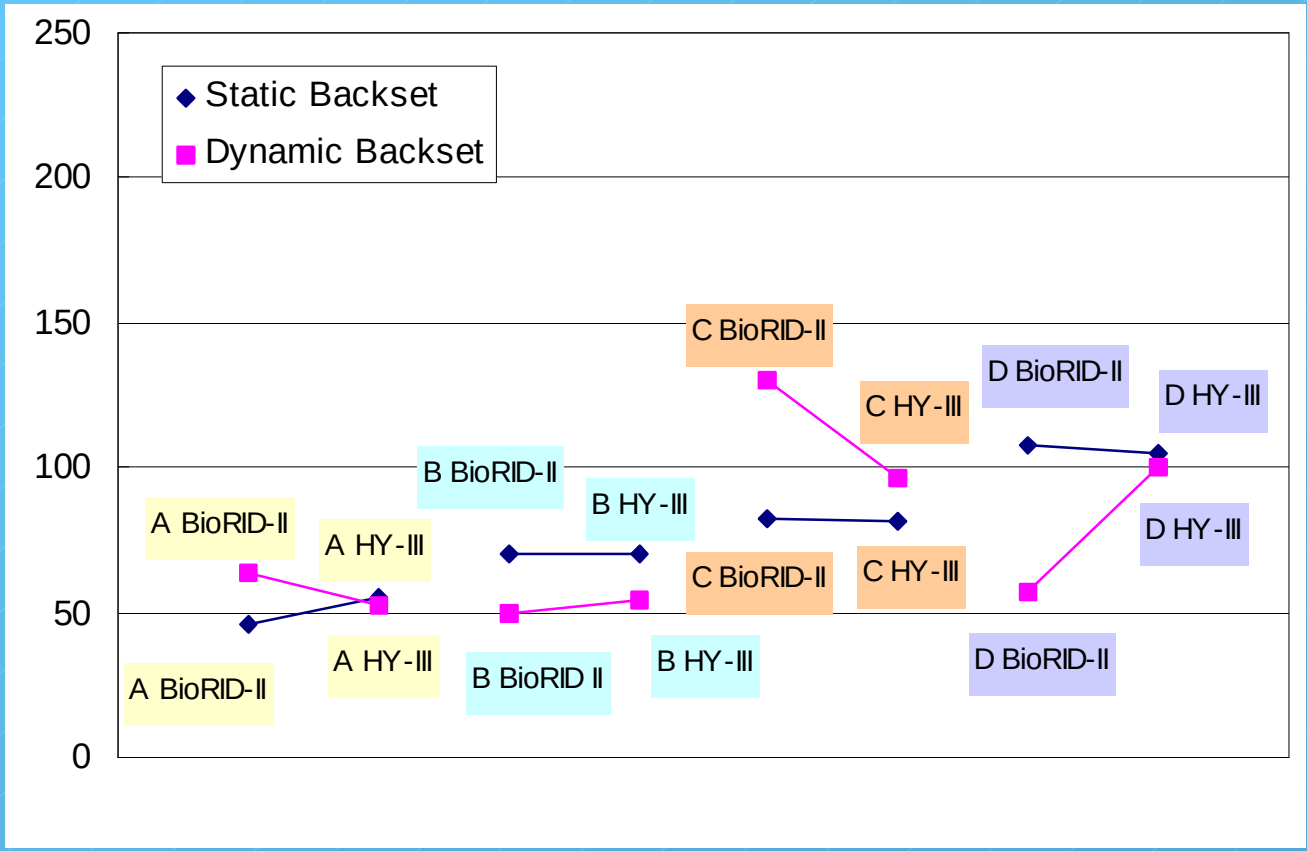
⇒ Need to introduce measures to reduce head position variations.



(Ex.)
Set dummy posture by using the Design HP and measure the x and z distance of CG of head from seat fix bolt.

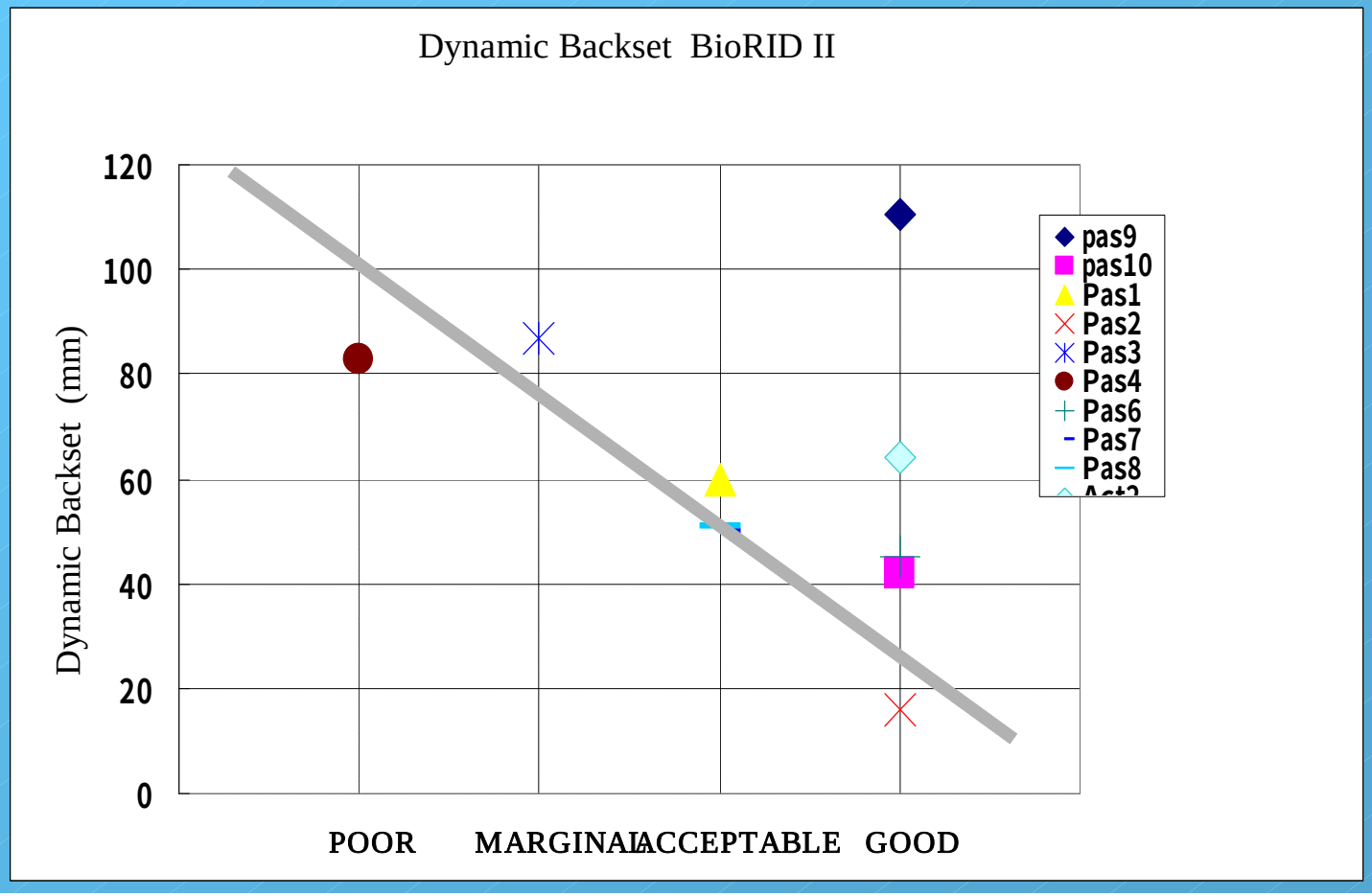
(4) Fairness to many kind of seat types

(a) Dynamic backset is not always smaller than static backset.



(b) Relation between Dynamic Backset and IIWPG Assessment

Largely correlated, but producing some conflicting results depending on seats, to require further examination



(5) Summary of Subject

(a) Validity as a whiplash evaluation index

- Possible to measure behavior, but impossible to measure load on neck

(b) As for reproducibility and repeatability

- BioRID2 dummy is suitable, but requires improvement in method of correcting and way of setting on seat
- Clarification of definition of Time of Head Motion and modification to T1 locator standard are required

(c) Fairness of various seat types

Produces some evaluations conflicting with IIWPG assessment depending on seat types, to require further examination

(6) Proposal

- Dynamic backset measurement is likely to validate in reproducing whiplash behavior, but requires to solve issues such as evaluation dummy, reproducibility of measuring method, thus difficult to introduce into gtr at present
- Load on neck also cannot measure, so that additional evaluation of injury index by measuring load and moment is considered to be required
- Therefore, the following is proposed as usual
  - Tentatively neck rear rotation angle of Hybrid-III is reduced to use
  - WG for studying dynamic evaluation method is established, to incorporate in gtr as phase 2 in the future

3. A New WG under Direct Control of GRSP

Necessary to set up the above WG proposed by HR GTR chairman at GRSP in May so as to formulate an appropriate Dynamic Test Method.

< Terms of Reference for WG >

- Sled pulse conditions ← Reflecting accident realities
- Assessment dummy ← Biofidelity level, Test method, Seating method, etc.
- Assessment criteria ← Reflecting injury phenomena; Assessed in terms of injury values
- Limit value ← An appropriate value based on injury risk analyses and feasibility studies
- Effect assessment ← Determining the injury reducing effect on real-world accidents

Thank you