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Japan Research Activities in the GTR-7 Phase 2 amendment  
**Bio RID II seating proposal #2**

**JASIC/Japan**

**Dec. 8. 2009**



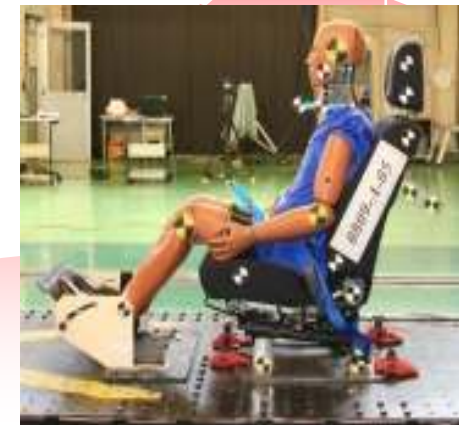
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1. Seating Condition Proposal
  2. Seating Procedure Proposal based on variation study
  3. Seating Procedure Proposal for smaller torso angle seat.



# Seating Condition Proposal

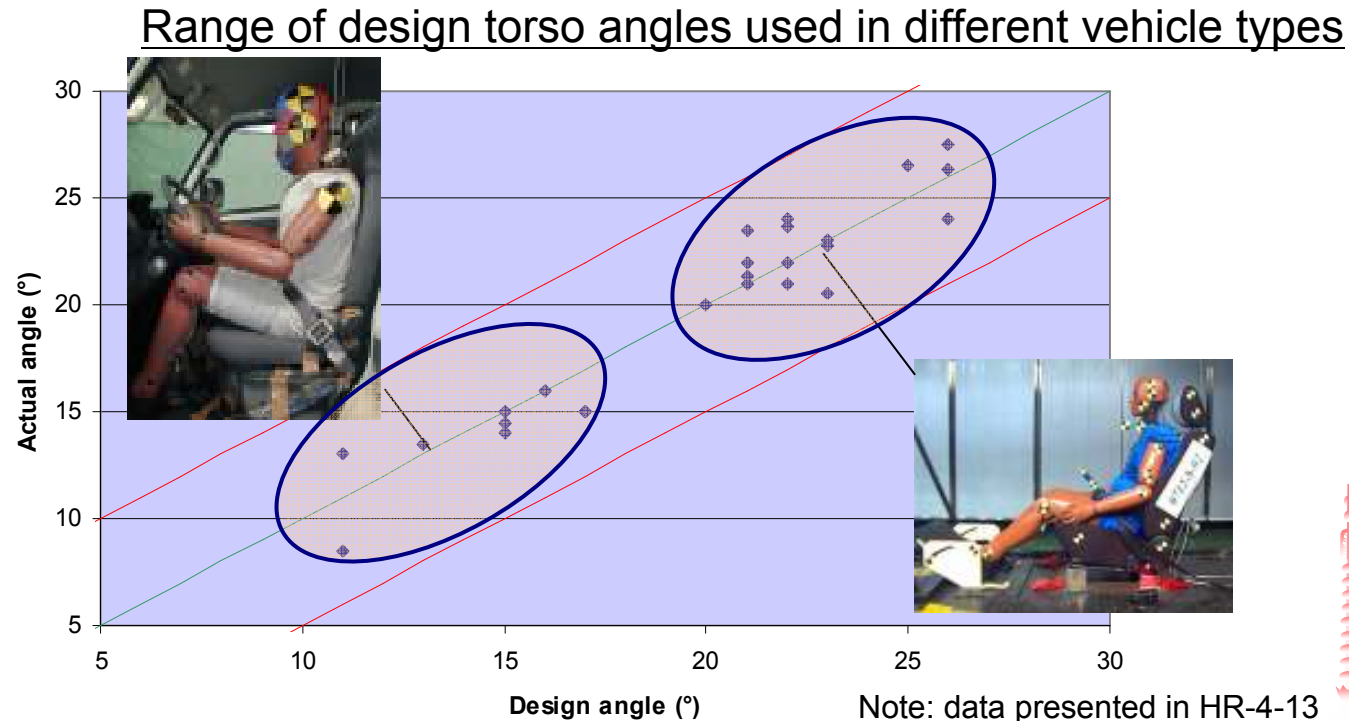
The dummy seating procedure should be modified from the IIWPG procedure as follows, as the actual seating angle is closer to the design torso angle. In addition, the dummy outputs are very sensitive to the static backset according to the simulation and test results.

- ① Seat torso angle:  
Design torso angle  $\leftarrow$  25 degrees
- ② Backset tolerance:  
 $\pm 2$  mm  $\leftarrow$   $\pm 5$  mm.
- ③ Special adjustment in the case of smaller torso angle seat



# ① Background of Design Torso Angle Proposal

Note: presented in HR-6-13



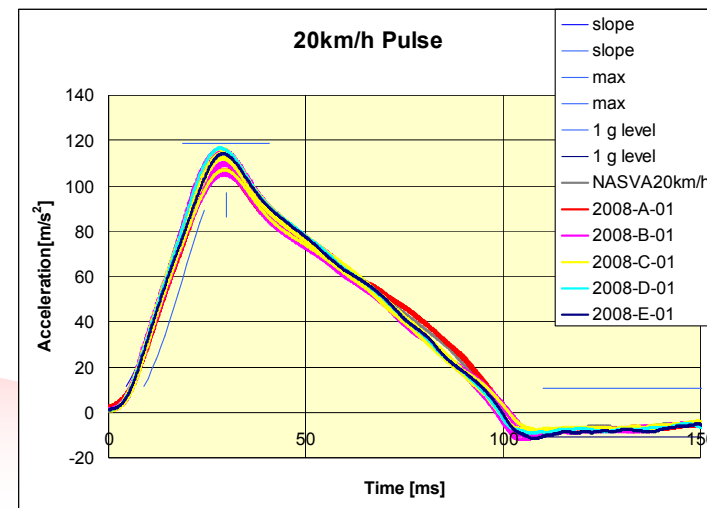
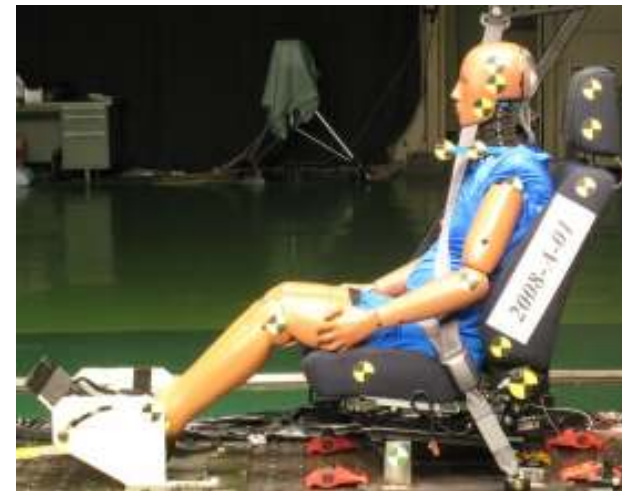
- Design torso angle is specified by typical driving posture for each type of vehicle and seating height. It is varied from 10° to 30° .
  - For certain seat designs, 25° bears no relation to the real world seating position and in some cases may not even be physically achievable
  - Advise the use of the procedure specified in ECE17 Annex 3
- All other safety tests, including vehicle crash tests, are conducted with the design torso angle.

## ② Seating procedure variation effect study

JARI has conducted the following tests to confirm the effects of seating variation.

- Back set : +5mm +10mm
- H-point +5mm +10mm
- Pelvis angle: +2.5° -2.5°

Crash Pulse : Delta V 20km/h  
Seat : Passive-type seat



# Seating procedure variation effect study

## Variation effect summary

Test No.	HRCT	Hx Acc.	T1 Acc.	Upper FX	Upper FZ	Upper MY-Fix.	Upper MY-Ext.	Lower FX	Lower FZ	Lower MY-Fix.	Lower MY-Ext.	NIC	OC-T1
2008-B-01~05 (Ave.)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
2008-B-06 (BS +5mm)	103.1	107.7	98.7	123.5	111.9	104.7	100.0	111.9	121.9	124.6	114.4	118.2	104.7
2008-B-07 (BS +10mm)	105.8	114.8	97.6	146.7	123.0	109.2	100.0	123.5	143.2	147.0	128.4	135.5	109.8
2008-B-08 (HP +5mm)	100.9	101.9	96.0	111.6	99.2	104.2	100.0	101.4	102.1	105.7	105.0	103.4	99.8
2008-B-09 (HP +10mm)	101.9	103.8	92.3	123.3	98.8	108.2	100.0	103.0	104.2	109.7	110.0	107.6	99.5
2008-B-10 (PA +2.5°)	97.7	100.2	89.8	106.5	101.7	103.3	100.0	102.7	105.4	103.2	102.8	89.6	96.3
2008-B-11 (PA -2.5°)	103.7	102.7	110.7	100.7	100.4	95.6	100.0	98.2	97.2	107.2	102.3	117.7	106.9

単位：%    ±5    ±10    ±20    ±21~

## Conclusion

- Back set variation produces the greatest effect on all indicators.
- H-point variation is the second effect on all indicators.

### ③ Smaller Design Torso Angle seat seating trial

Purpose:

- To discover problems with the Bio RID II seating procedure. If the design torso angle seat is less than 20 degree.
- To study route cause and to propose countermeasures.

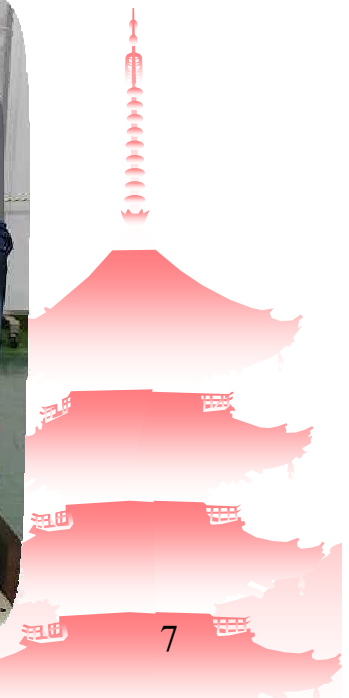
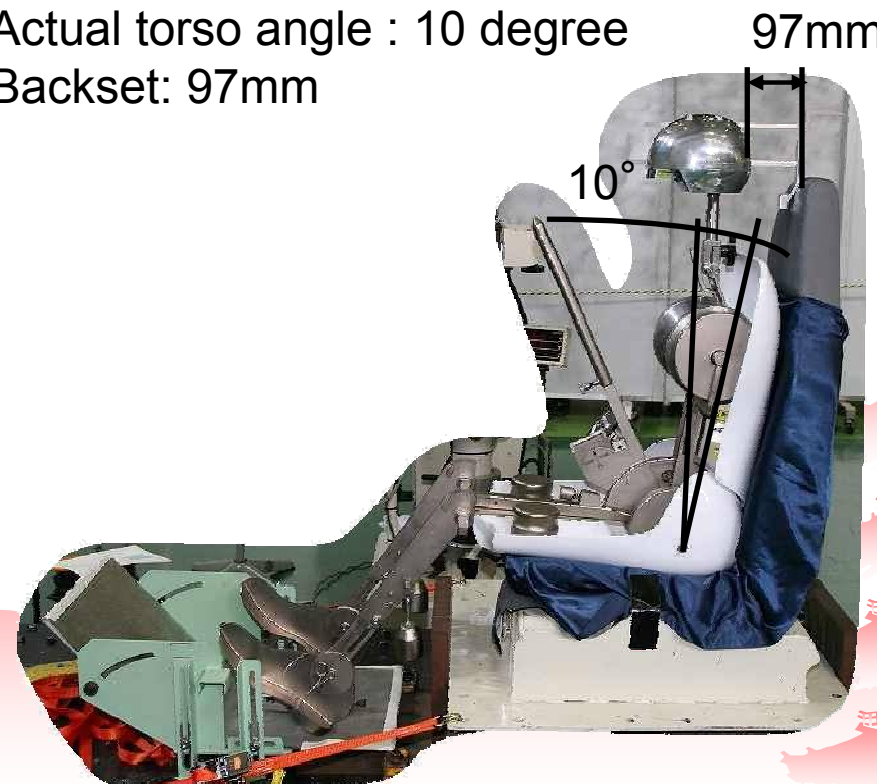
Sample seat

Small van



13 degree design torso angle seat

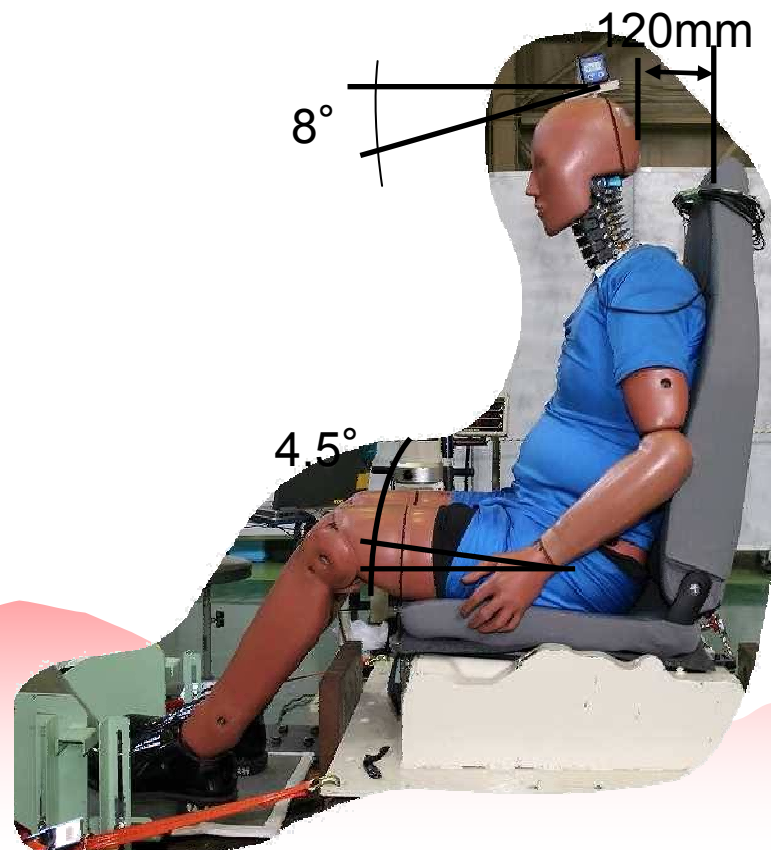
- Actual torso angle : 10 degree
- Backset: 97mm



# Smaller Design Torso Angle seat seating trial

Problem:

- Head can not remain **laterally level**.
- Distance between head and head restraint is greeter than backset+15mm (112mm).
- Pelvis angle can not maintain torso angle + 1.5 degree.

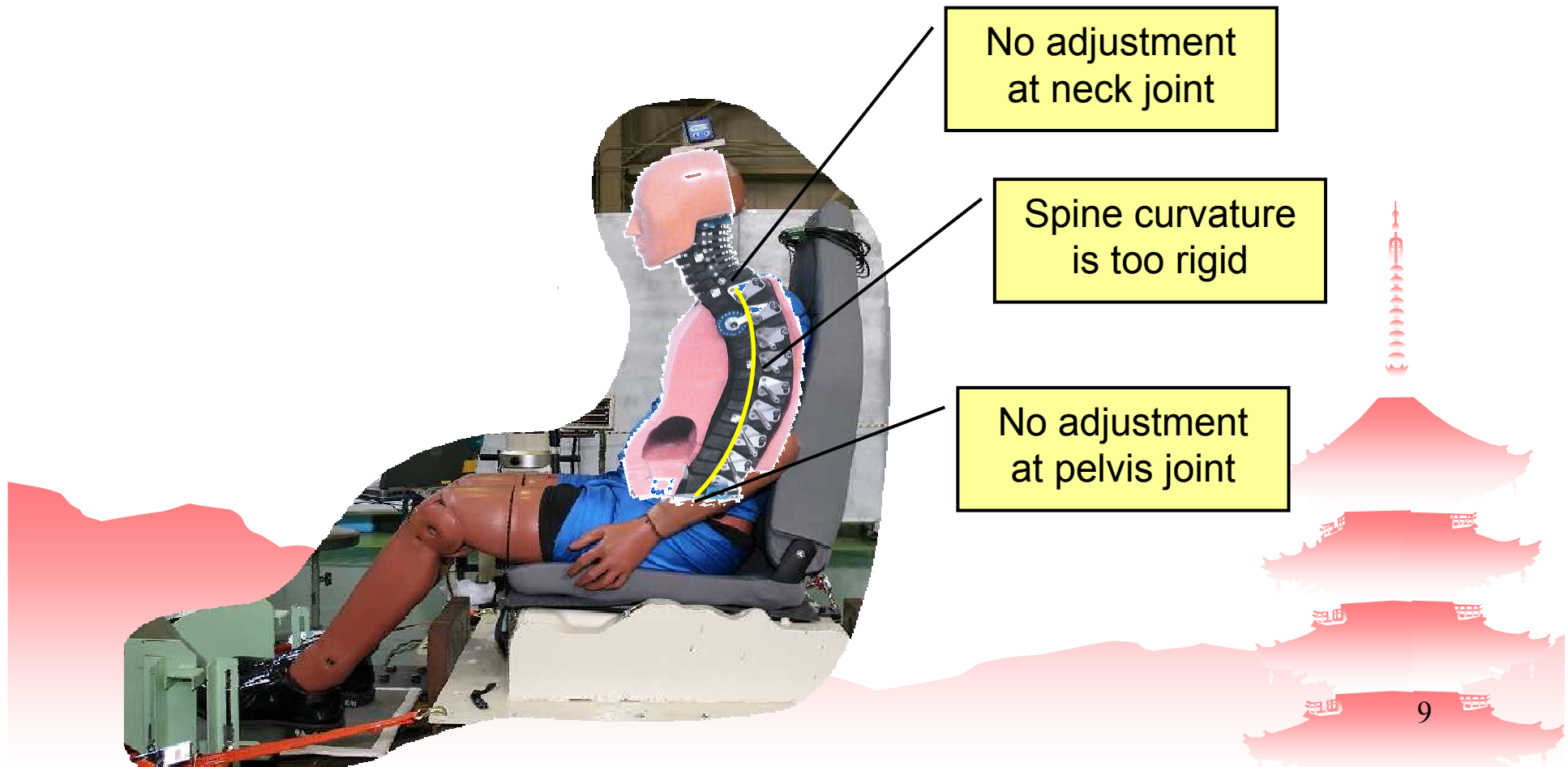




# Smaller Design Torso Angle seat seating trial

## Route cause study

- Spine curvature allows less flexibility due to the design for 25 degree seating posture.
- There is no adjustment capability at neck joint and/or pelvis joint.



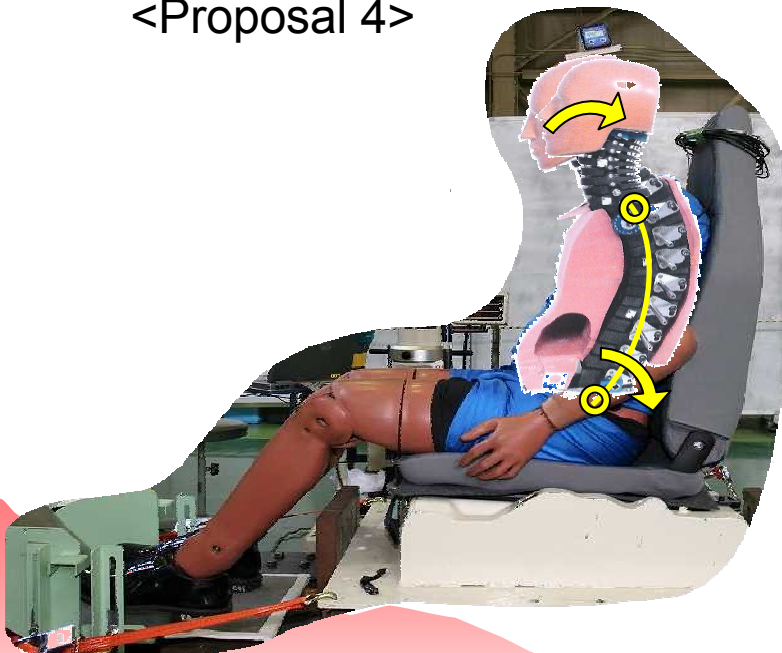
# Smaller Design Torso Angle seat seating trial

## Recommendation

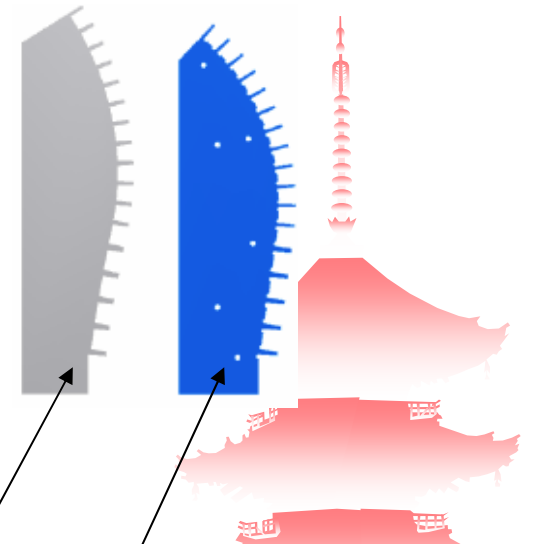
### ✓ Proposal 4:

- This proposal is feasible as a permanent solution.
- A tentative solution may need to be considered depending on the difficulty of modification.

<Proposal 4>



**Develop a new comb to adjust spine for 15 degree torso angle.**



New tool

Current tool

Thank you for your attention !

