Correlation of Evaluation Results between FMVSS 202a (Hybrid III) and IIWPG (BioRID II) Tested in the Same Seat

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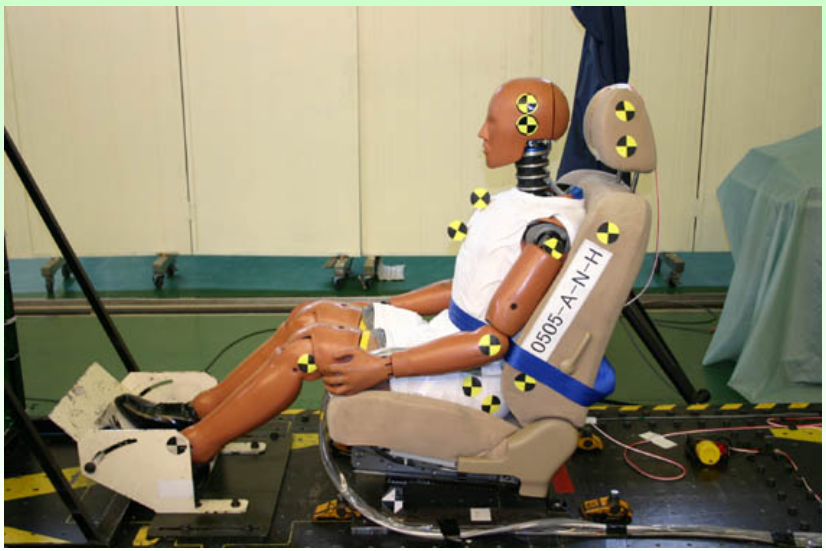
Objective

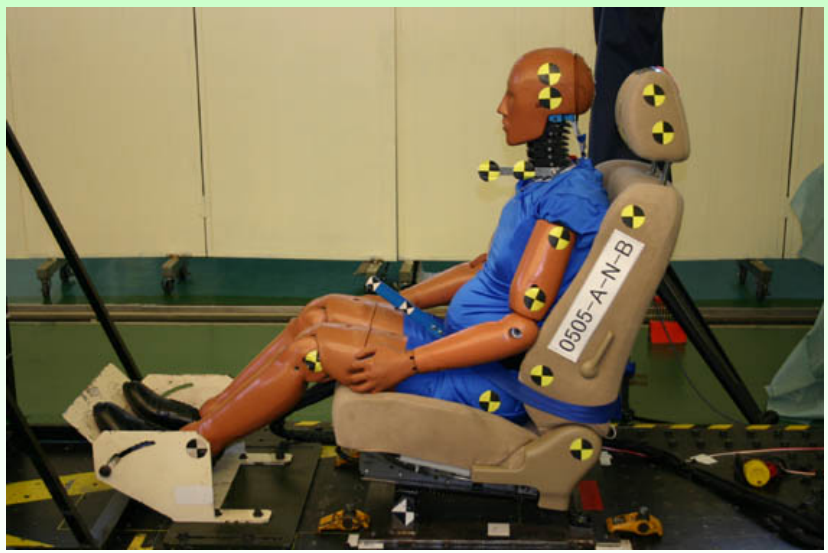
To examine correlation

between FMVSS 202a evaluation using a Hybrid III

and IIWPG evaluation using a BioRID II.



Hybrid III

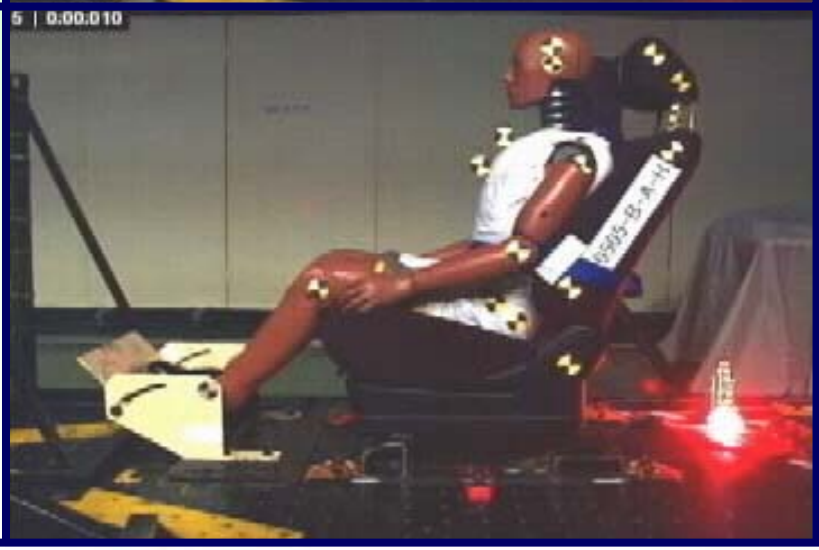


BioRID II

Test Conditions#1

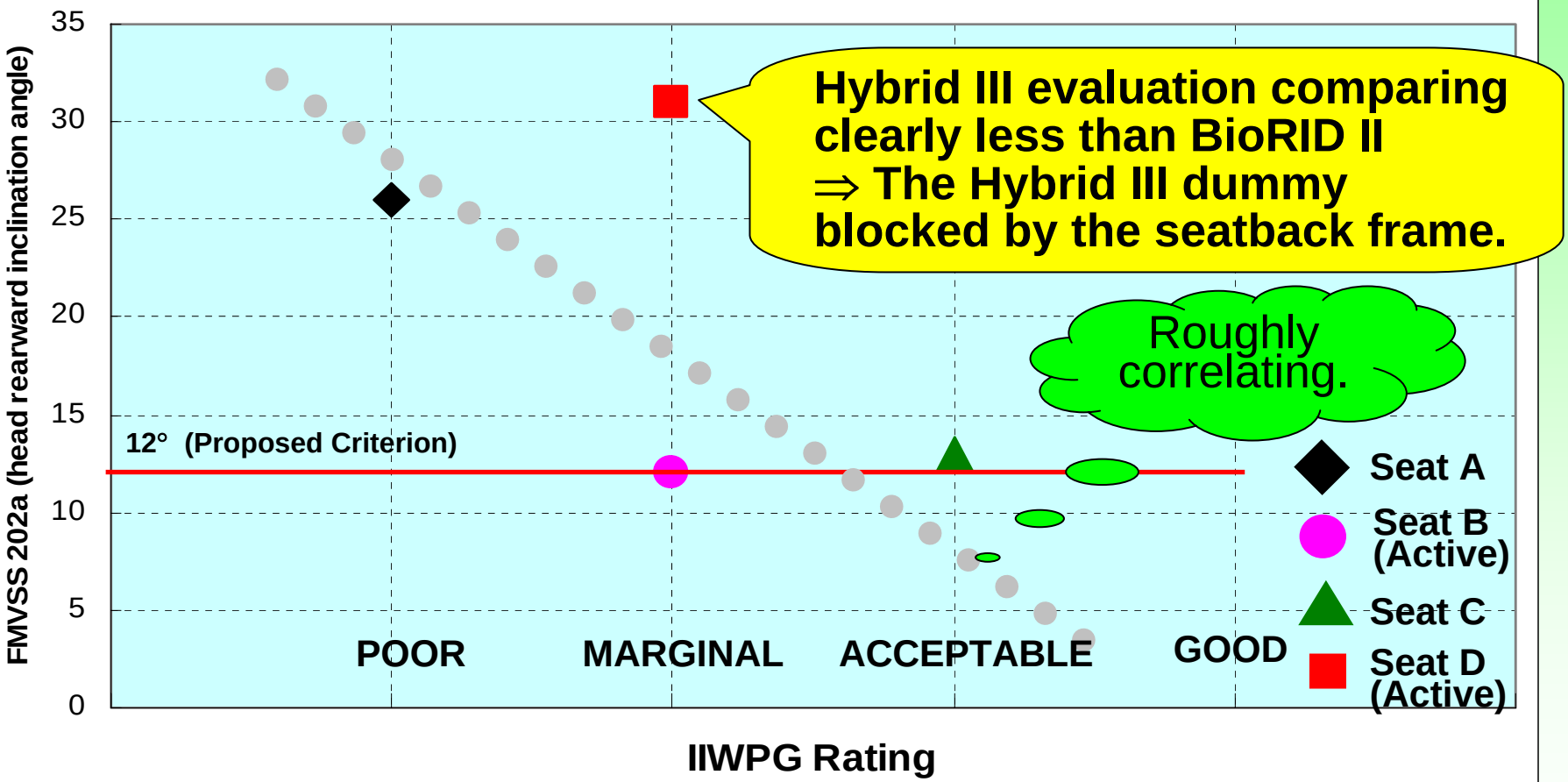
- **Simulated rear-end impact tests using HYGE Sled**
- **Crash pulse : FMVSS 202a**
- **Measurements :**
  - **Sled acceleration**
  - **Head, T1, Chest, and Pelvis acceleration**
  - **Neck forces**
- **High speed video :**
  - **Kinematics**
- **Seat :**
  - **Normal HR - 2 types**
  - **Active HR - 2 types**

Side View of Test

	Hybrid III	BioRID II
Normal Seat		
Active HR Seat		

Result

FMVSS 202a (Hybrid III) vs IIWPG (BioRID II) Evaluations



IIWPG Neck Injuries "GOOD" Criteria

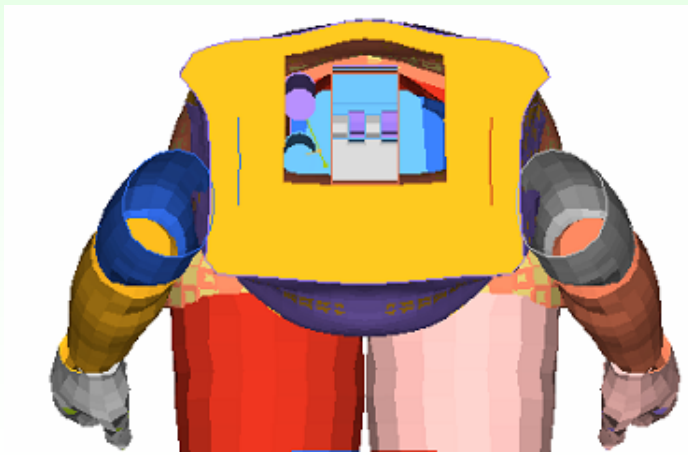
T1 x-acceleration ≤ 9.5 g Or Time to HR contact ≤ 70 ms

* Neck Shear Fx < 150N * Neck Tension Fz < 750N

Differentiating Factors Between FMVSS 202a (Hybrid III) and IIWPG (BioRID II)

- In the Hybrid III, the spine is encircled by rigid and mutually joined ribs and covered by a skin layer 10-15 mm thick.
- While the BioRID II has a thicker urethane skin layer. Combining a thicker skin layer and a flexible spine, BioRID II can more easily intrude into the seatback even when the vehicle is mini-sized and its seatback frame small -- thus, comparing better than Hybrid III.
- The same factors should be applicable to humans.

Hybrid III

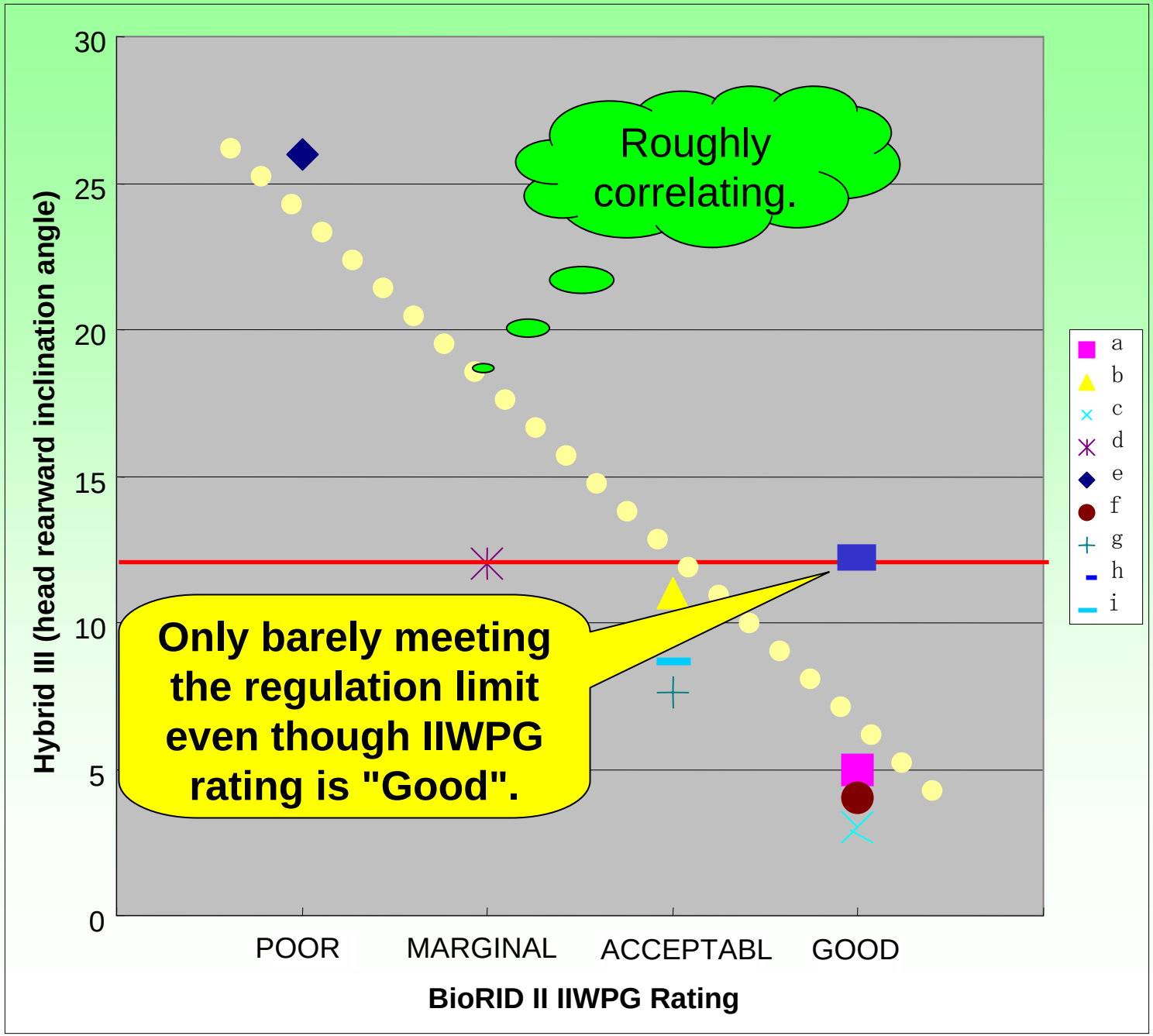


BioRID II

Test Conditions#2

- **Simulated rear-end impact tests using HYGE Sled**
- **Crash pulse :**
  - **FMVSS 202a for Hybrid III**
  - **IIWPG for BioRID II**
- **Measurements :**
  - **Sled acceleration**
  - **Head, T1, Chest, and Pelvis acceleration**
  - **Neck forces**
- **High speed video :**
  - **Kinematics**
- **Seat :**
  - **Normal HR - 7 types**
  - **Active HR - 2 types**

FMVSS 202a (Hybrid III) vs IIWPG (BioRID II) Evaluations



Conclusion

1. There is a certain correlation between Hybrid III head rearward inclination angle and BioRID II test results, but in some cases the angle shot up above the limit even though the BioRID II IIWPG rating is "Marginal".
   - The primary factor for angle rise in Hybrid III is likely its un- human like rigid ribs and spine, which make intrusion into the seat difficult when the seatback width is limited as in a mini car.
2. In some cases the head rearward inclination of Hybrid III barely satisfies the limit angle even though the BioRID II IIWPG rating is “Good”.
   - The FMVSS202a requirement is too strict.
3. The above findings suggest that Hybrid III gives poor results due to its unique factors absent in human bodies. Consequently, OICA has concern about the adoption of the Hybrid III to GTR.

Thank you