

International Dummy Working Group  
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# Compatibility Between Two Rear Impact Dummies and Two Rear Impact Pulses

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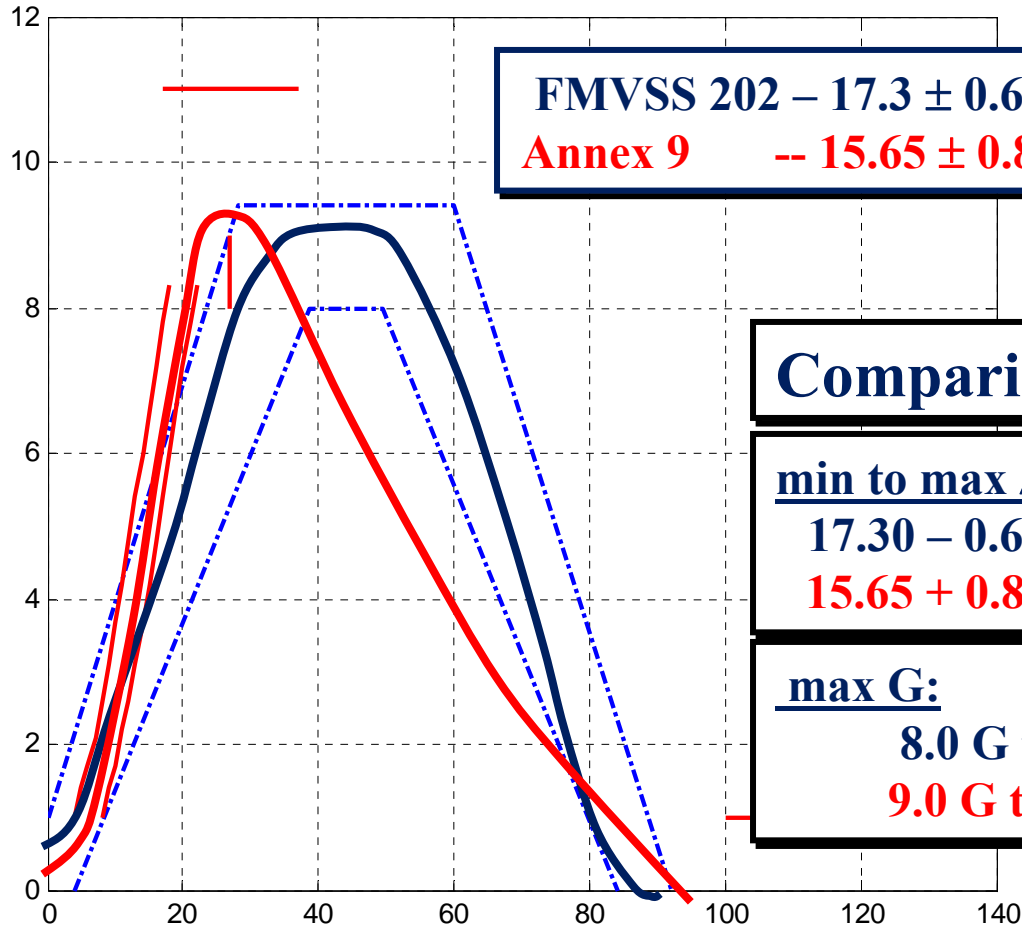
# *Annex 9/FMVSS 202 Pulse Testing*

- **Objective**
  - **Test BioRID II & HIII 50<sup>th</sup> with FMVSS 202 pulse**
    - **In four levels of backset**
    - **Very bad, bad, good, very good**
  - **Test BioRID II & HIII 50<sup>th</sup> with Annex 9 pulse**
    - **In four levels of backset**
    - **Very bad, bad, good, very good**
  - **Evaluate results**
    - **Dummy response – same trend?**
    - **202a & J-NCAP, E-NCAP scores – are seats rated similarly?**



# FMVSS 202 vs Annex 9

Curves are approximate



## Comparison:

### min to max $\Delta V$ :

$$17.30 - 0.6 = 16.70 \text{ kph}$$

$$15.65 + 0.8 = 16.45 \text{ kph}$$

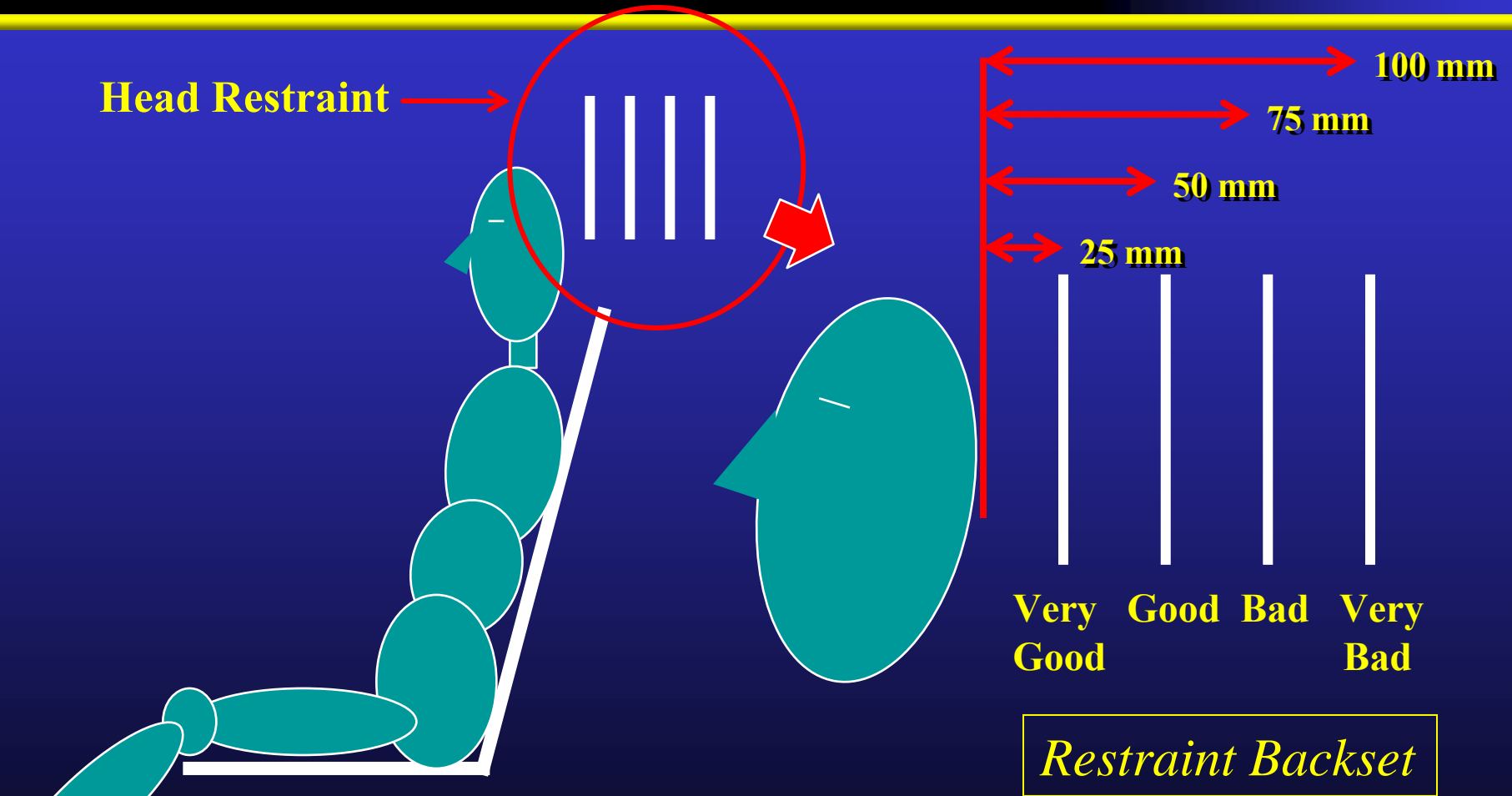
### max G:

$$8.0 \text{ G to } 9.4 \text{ G}$$

$$9.0 \text{ G to } 11.0 \text{ G}$$



# Four Head Restraint Positions



# *Test Matrix* by test number

Test	Pulse	Backset	Occupants
1 – 4	202a	25, 50 mm (Good) 75, 100 mm (Bad)	BioRID II & HIII
5 - 8	<b><i>Repeats of above conditions</i></b>		
9 - 12	Annex 9	25, 50 mm (Good) 75, 100 mm (Bad)	BioRID II & HIII
13 - 16	<b><i>Repeats of above conditions</i></b>		

- Rear Impact Research Buck
  - Repeatable seat back “collapse”
  - Instrumented seat backs (load, acceleration, angular velocity)
  - Side-by-side configuration
- Backset conditions randomized
- Instrumentation and video analysis redundancies/comparisons



# *Analysis*

## Dummy Results:

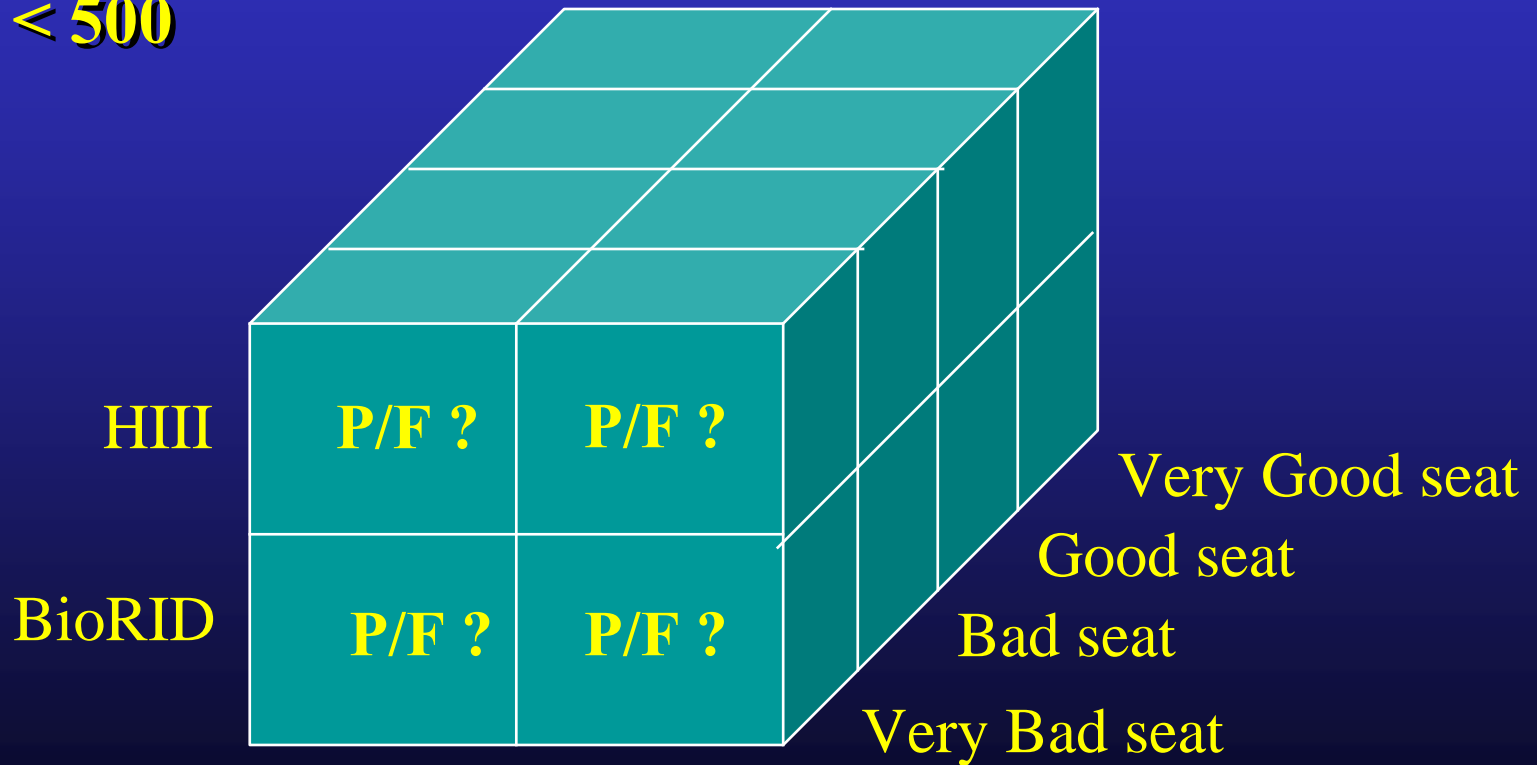
- Upper neck My
- Lower neck My
- Upper neck Fz
- Upper neck Fx
- Lower neck Fz
- Lower neck Fx
- Head X & Z acceleration
- HIC
- T1 X & Z acceleration
- Head w/r T1 Angle
- NIC
- Nkm

**Do the two dummies and two pulses  
rate seats the same?**



# Analysis: FMVSS 202a

- Head to T1 max. angular displacement  $< 12^\circ$
- $HIC_{15} < 500$



# Analysis: EuroNCAP

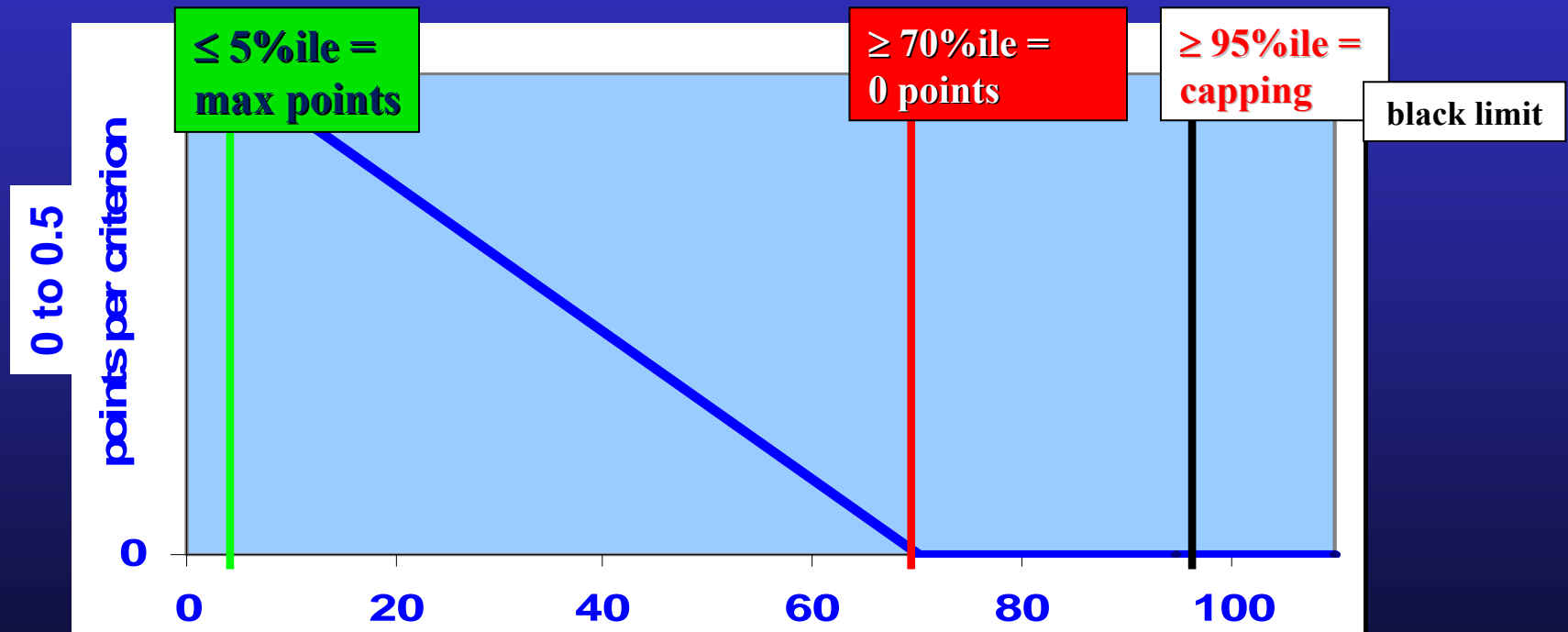
## High, Low and Capping limits – medium pulse

Euro NCAP Criteria	Units	Medium Severity		
		HPL	LPL	CL
NIC	$m^2/s^2$	11,00	24,00	27,00
Nkm	-	0,15	0,55	0,69
Rebound velocity	m/s	3,20	4,80	5,20
Upper Neck Shear Fx	N	30,00	190,00	290,00
Upper Neck Tension Fz	N	360,00	750,00	900,00
T1 acceleration	g	9,30	13,10	15,55
Time to head restraint first contact	ms	57,00	82,00	92,00





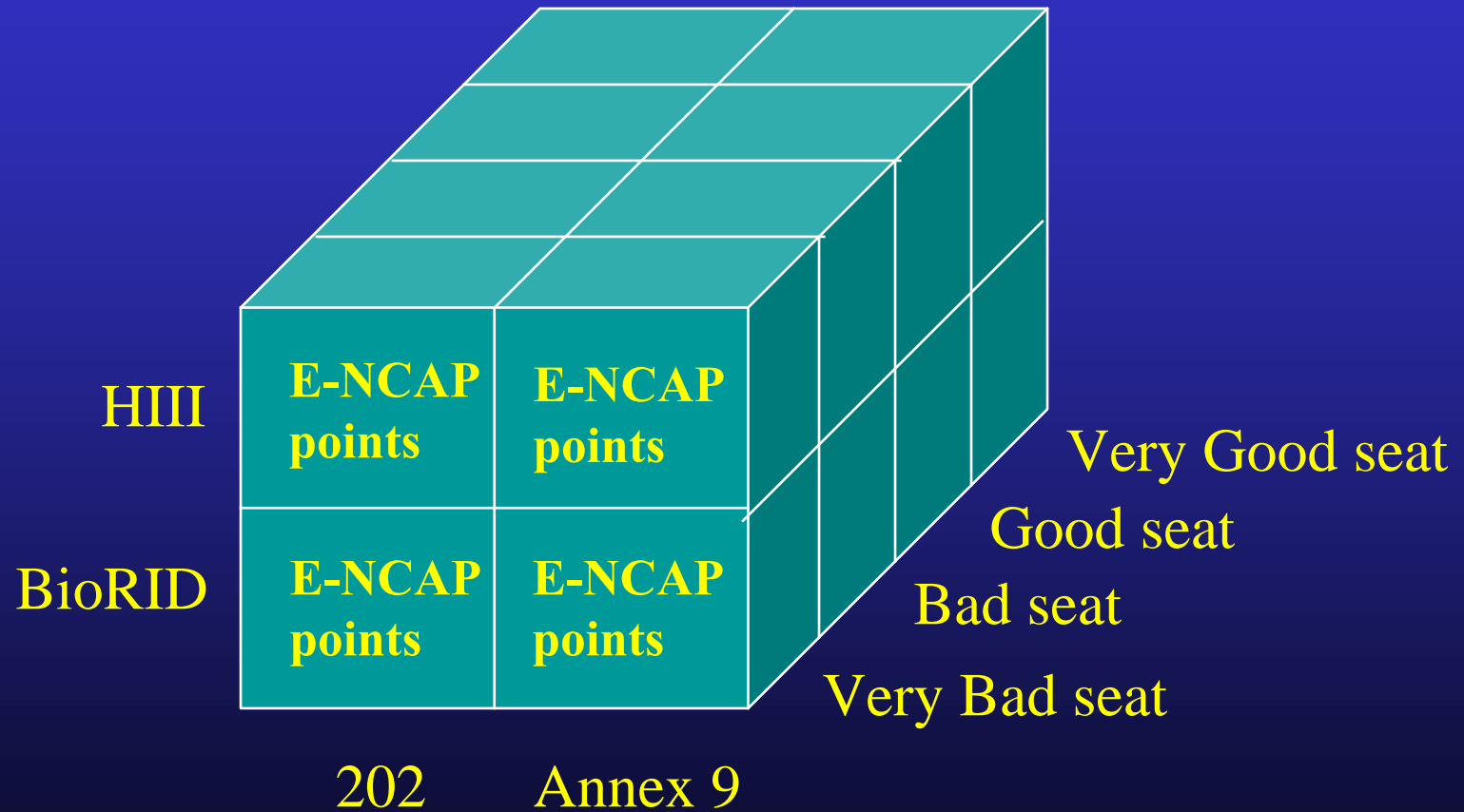
# Analysis: EuroNCAP



Six criteria \* 0.5 points max. each = 3 points max.



# *Analysis: EuroNCAP*



# Analysis: J-NCAP

NIC – 4 points max.

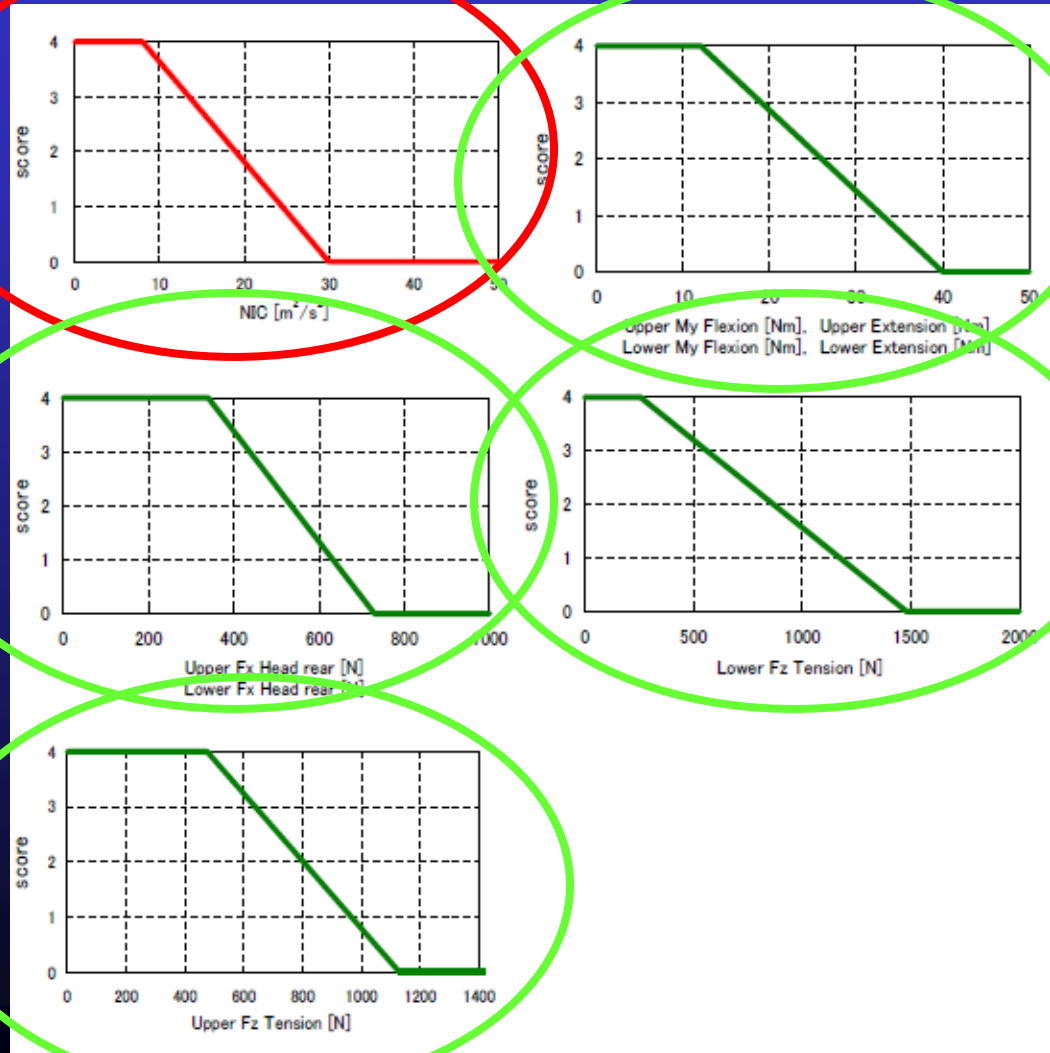
Upper/Lower My – 4 points max.

Upper/Lower Fx – 4 points max.  
(head backward)

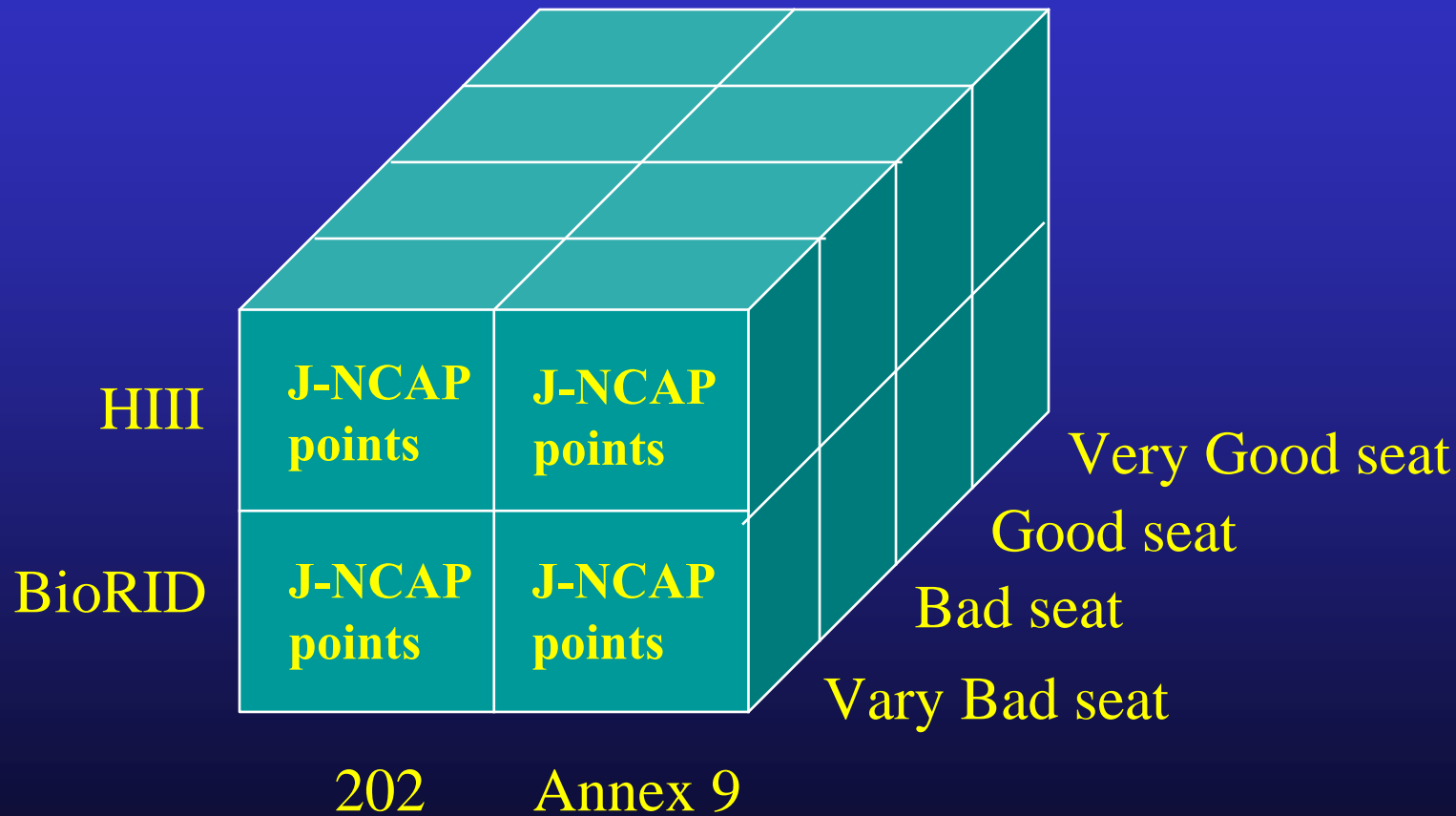
Upper Fz – 4 point max.  
(tension)

Lower Fz – 4 points max.  
(tension)

Score =  $\text{NIC} + \text{Worst} * 2$   
12 points max.

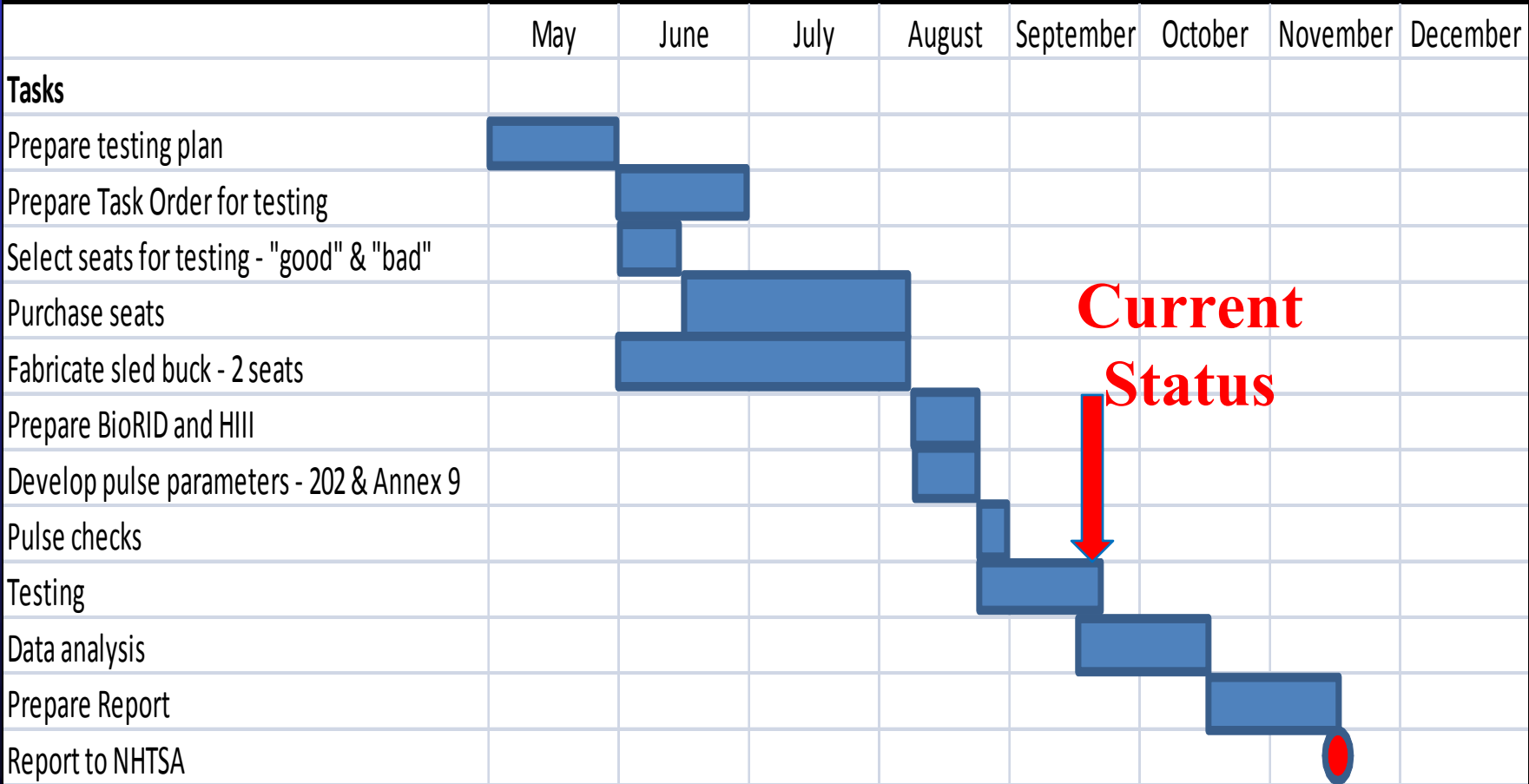


# *Analysis: J-NCAP*



# Schedule

## Annex 9/FMVSS 202 Testing with BioRID and HIII



**Thank you**

