

Proposal for Belt Anchorage Points

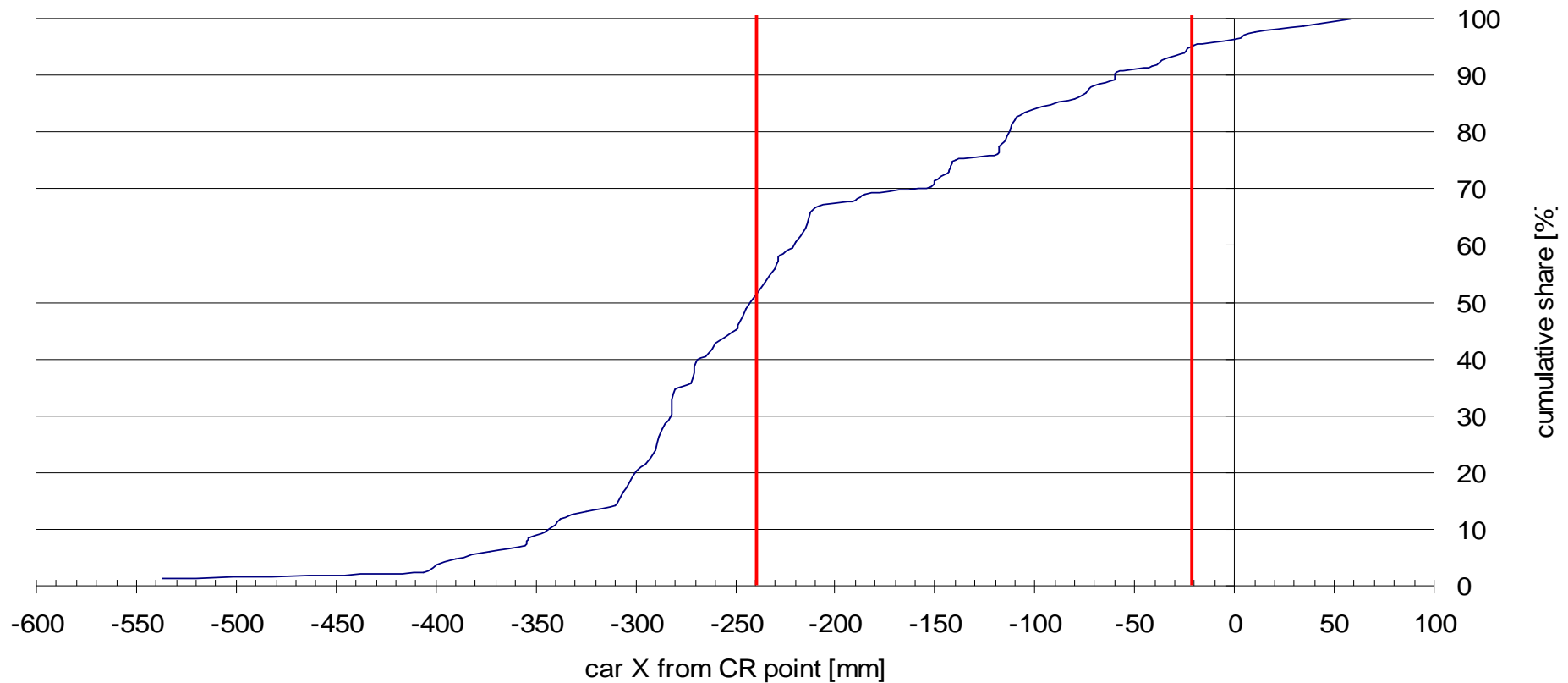
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NPACS Belt Anchorage Points

Anchorage	Upper (Mid Position)			Upper (Fwd Position)			Lower inner (buckle)			Lower outer		
	x	y	z	x	y	z	x	y	z	x	y	z
Distance (mm)	-240	-250	-630	-21	-250	-630	-29	200	59	10	-200	14.5

- Positions acquired based on car measurements
 - Front seats
 - In most rear position
 - Rear seats
- Upper Fwd Position seems to result from specific single cases and is considered as not being relevant for regulation

Upper Anchorage Position X from NPACS Measurements



FWD NPACS Upper Anchorage Position for Adults



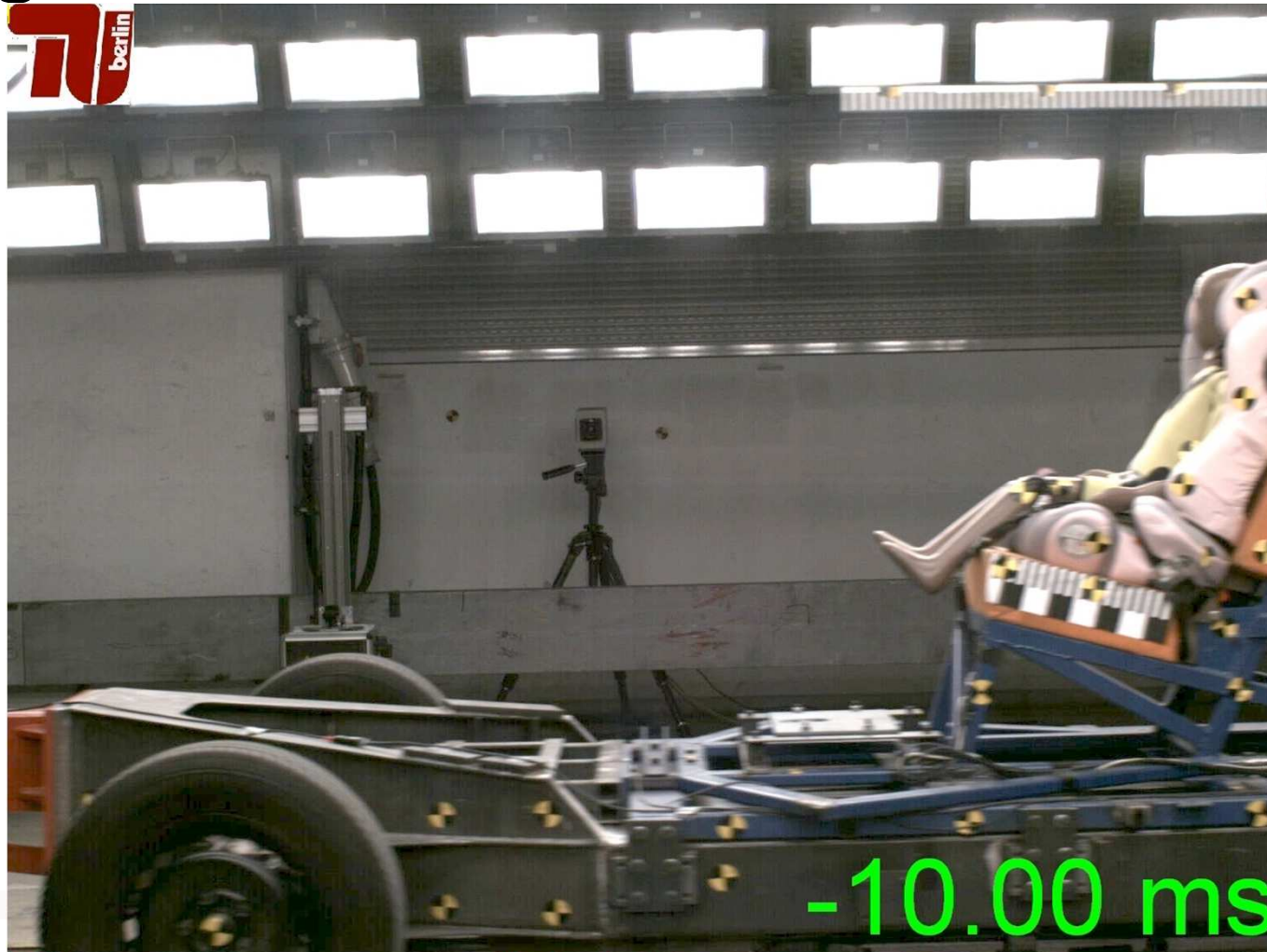
FWD NPACS Upper Anchorage Position for Adults



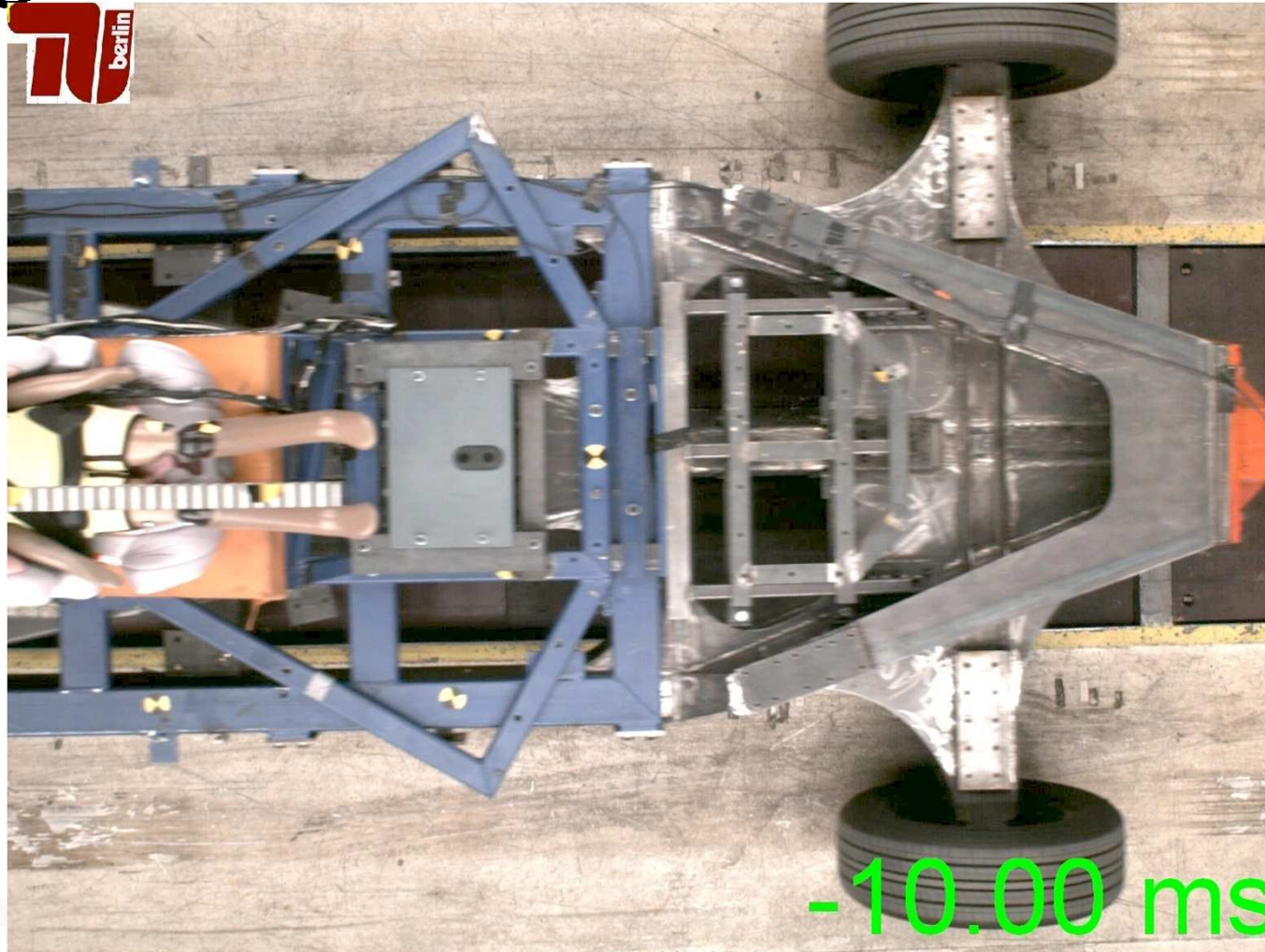
FWD NPACS Upper Anchorage Position for CRS



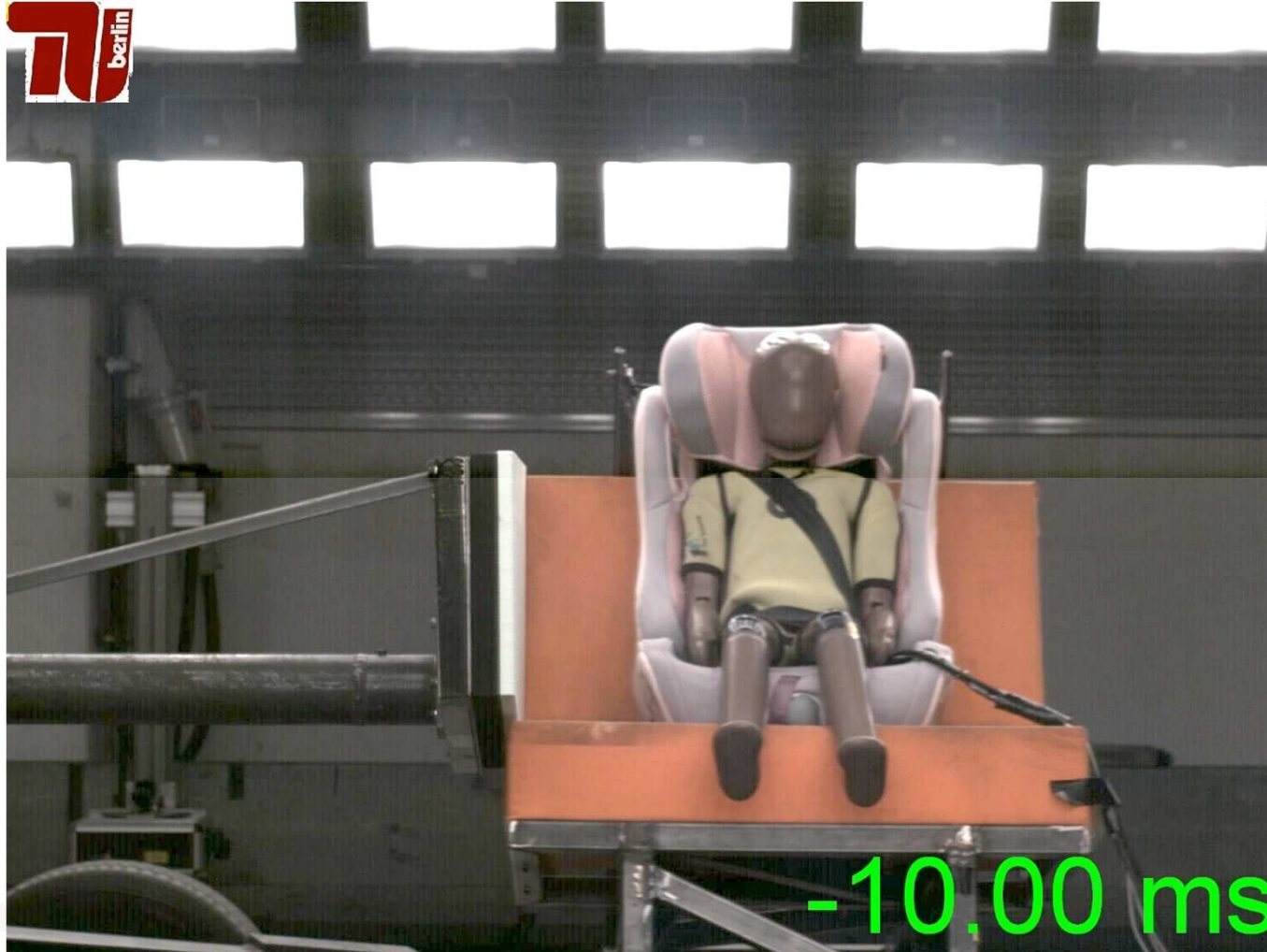
Test Experience with NPACS Belt Anchorage Points



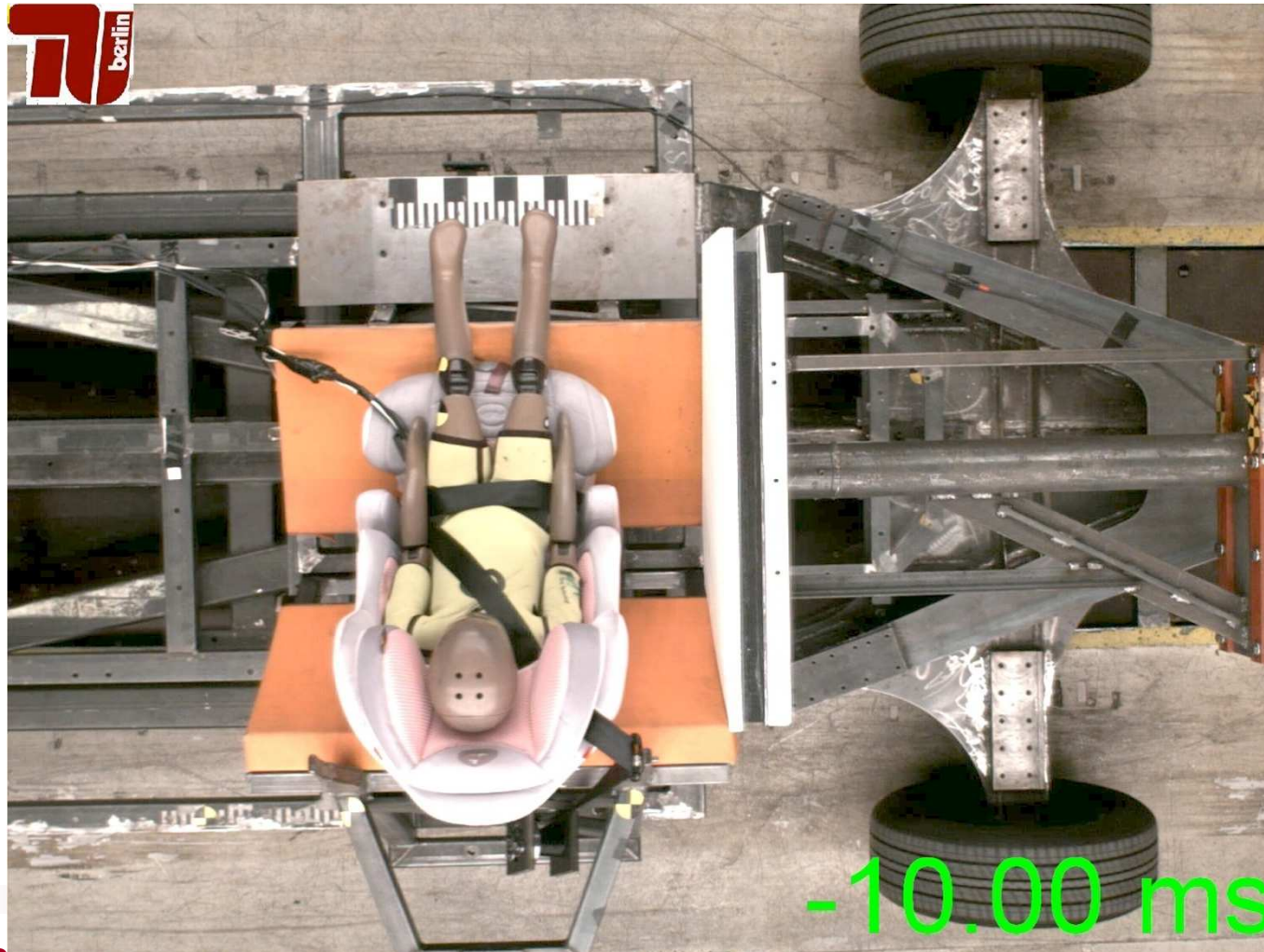
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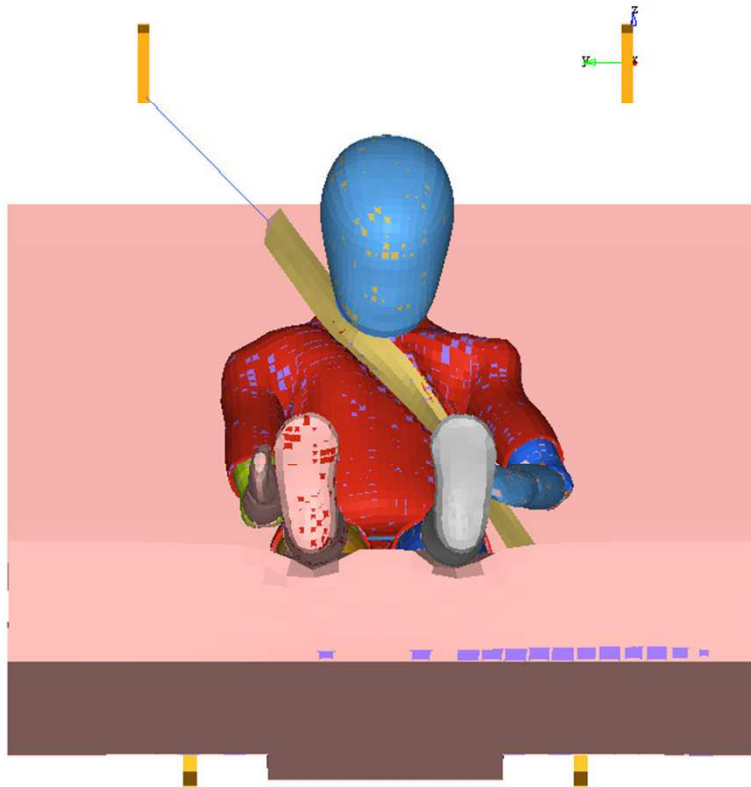


Problems with Anchorage Points

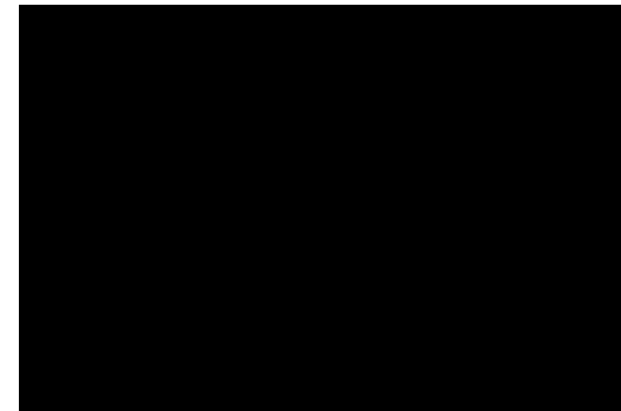
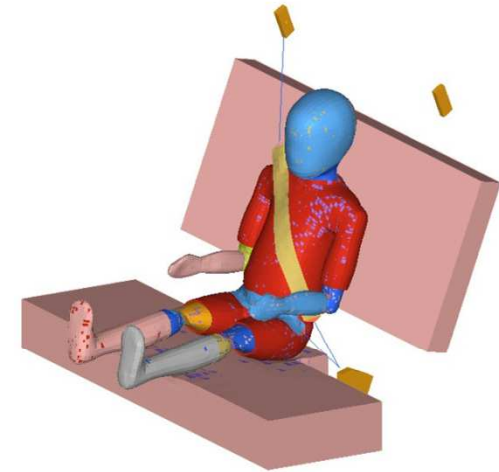


Problems with Anchorage Points

- Q6 dummy without booster on new bench
- shoulder belt slippage towards the neck



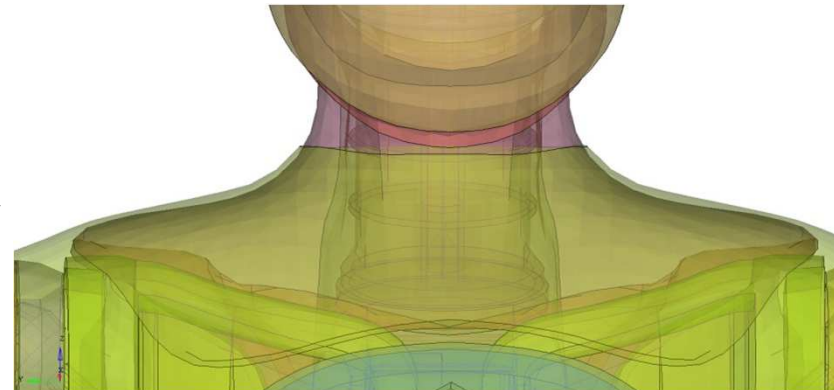
t=68ms



Solution approach 1 stiffening of neckshield

Exchange of material parameters with same material

- Doubling and quadrupling of Young's modulus
- Doubling of density
- Young's modulus of steel



Result:

Shoulder belt still moves as in starting simulation

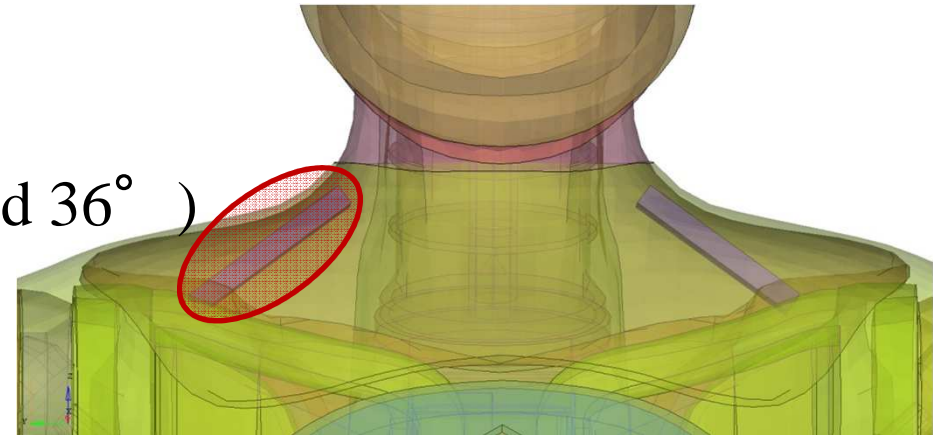
Solution approach 1 stiffening of neckshield

Additional element for stiffness

-In the neck shield additional block, connected to lower
load cell bottom

-Three different angles (0° , 18° and 36°)

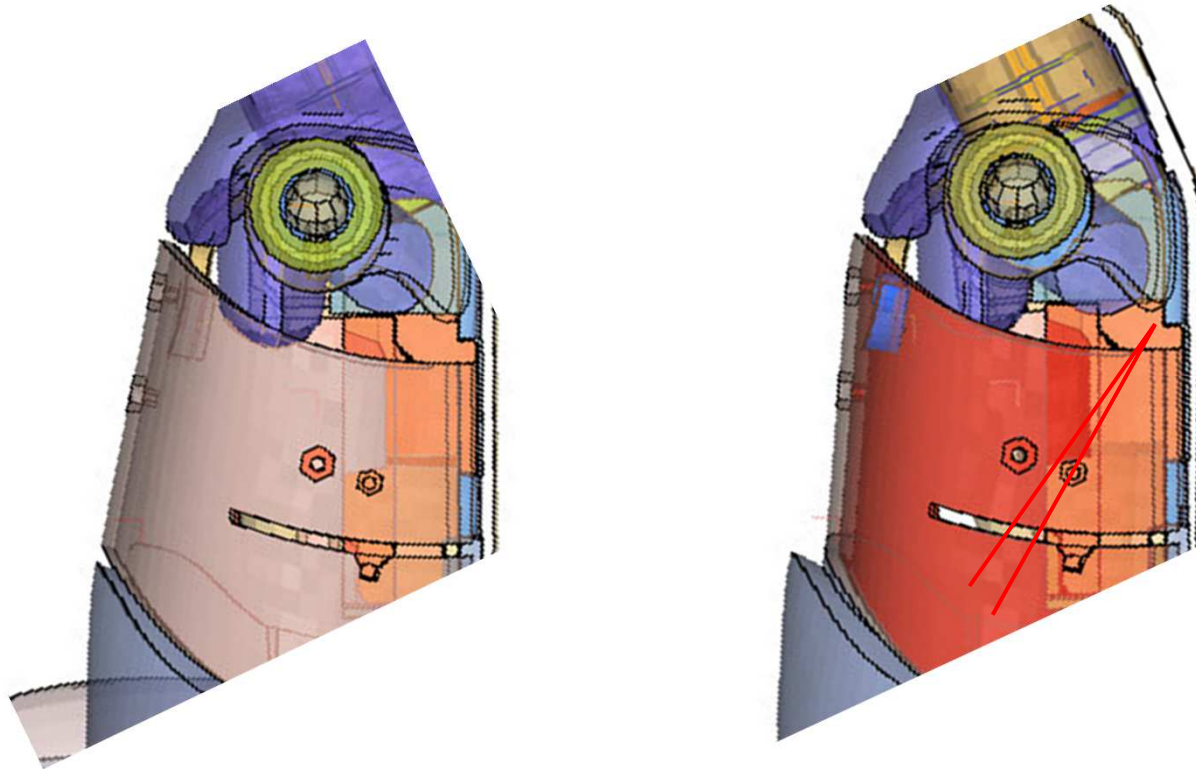
-Defined as *RIGID_BODY



Result:

Shoulder belt still moves as in starting simulation

Solution approach 2 modification of sternum



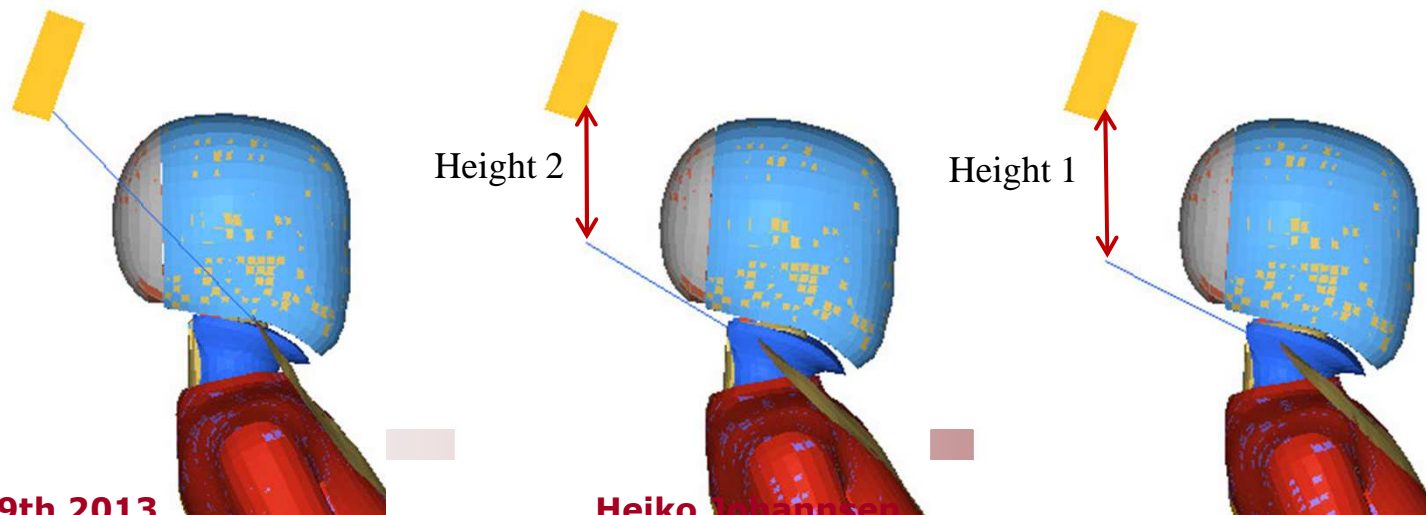
Result:

Shoulder belt still moves as in starting simulation

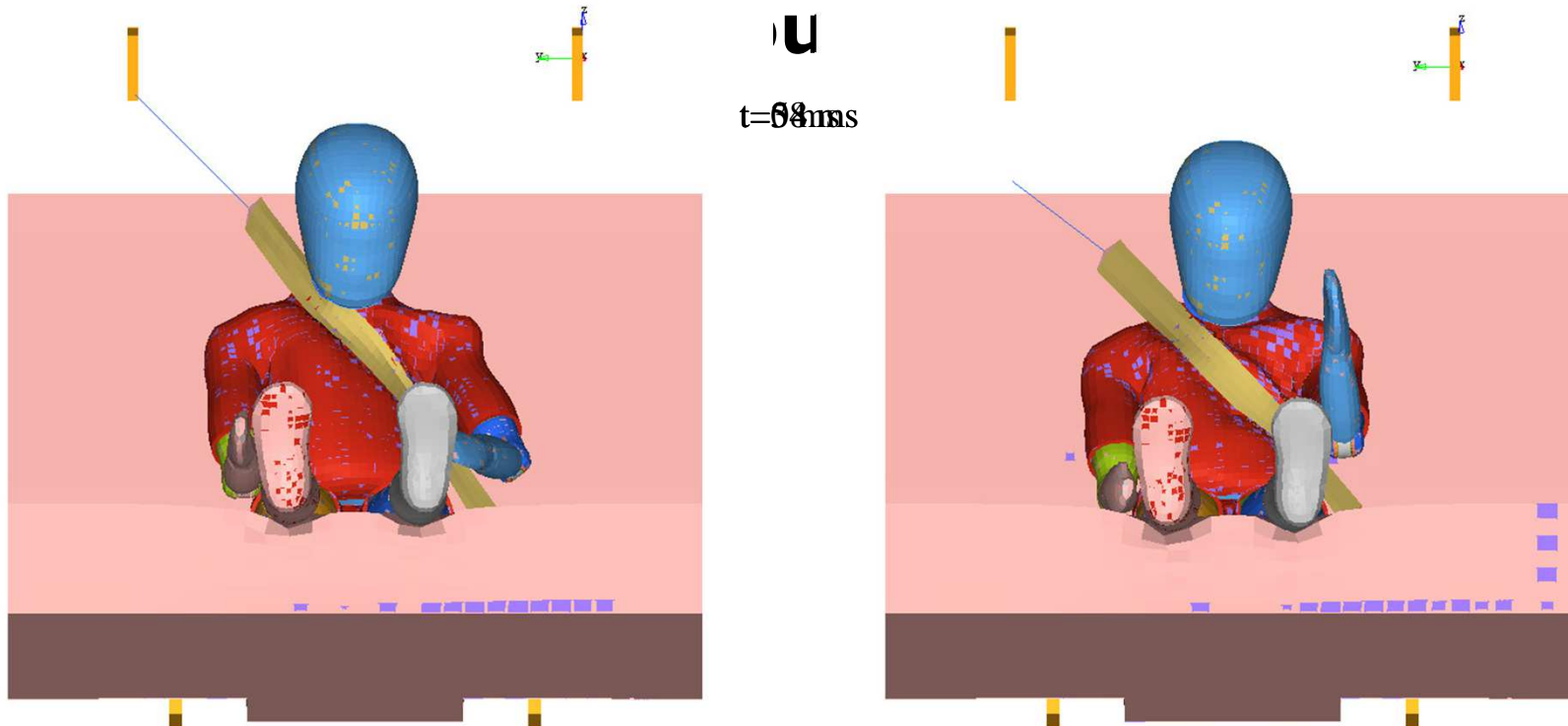
Solution approach 3 modification of belt routing

Height of shoulder belt attachment in 5 levels lowered

- Height 1: top edge of back rest (114 mm)
- Height 2: 100 mm lower than original height
- Heights 3 – 5: each level 20 mm higher than previous
- Only z-components are modified



Solution approach 3



U
 t=68ms

Result:

Shoulderbelt doesn't move to neck in Height 1 and 2

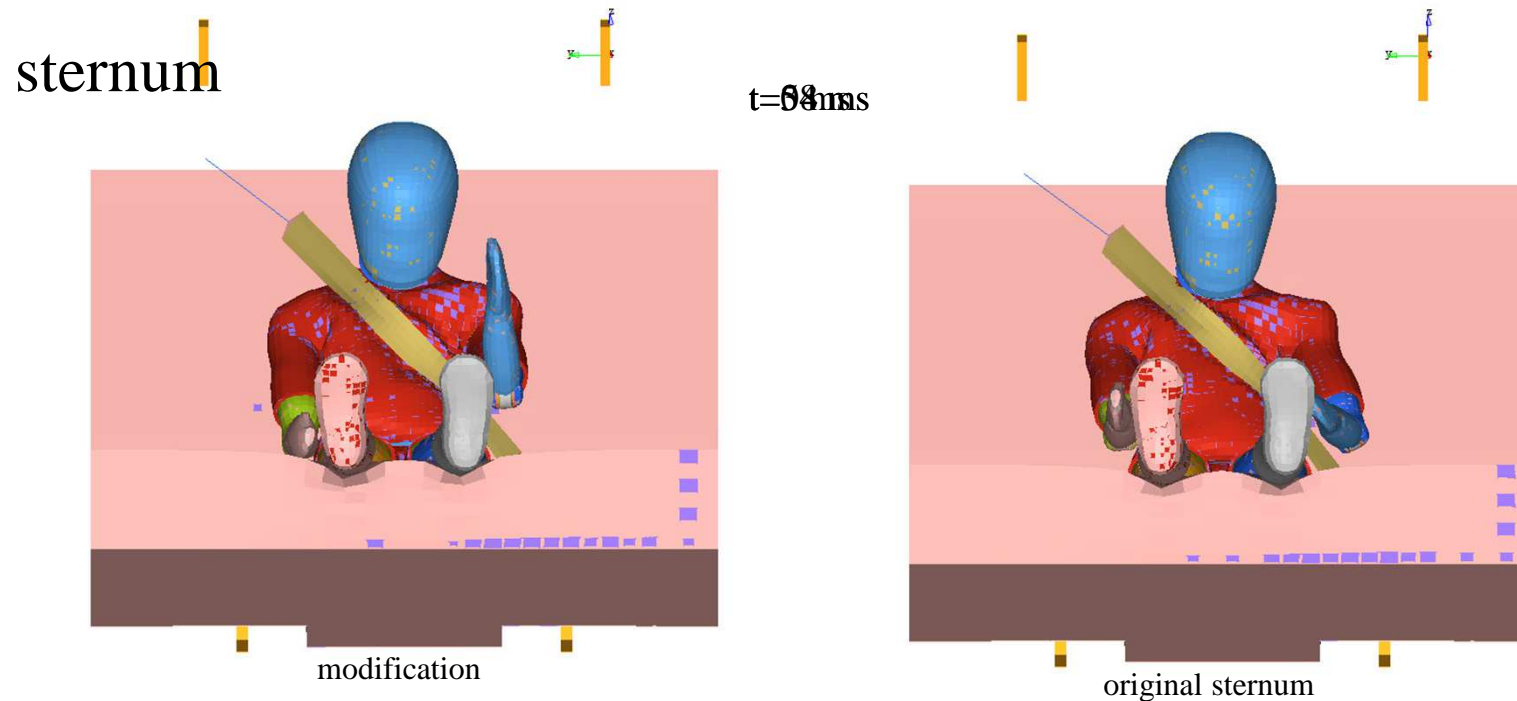
Height 0

Height 1

Height 2

Solution approach 3 modification of belt routing

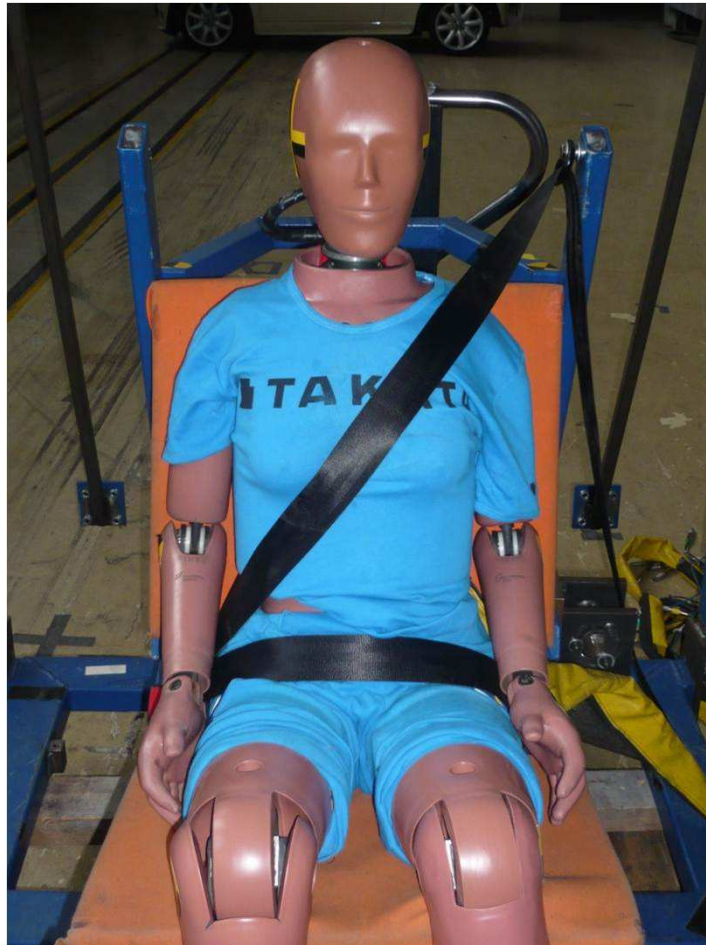
Modified shoulder belt attachment in combination with modified



Result:

Modification of sternum doesn't affect the results

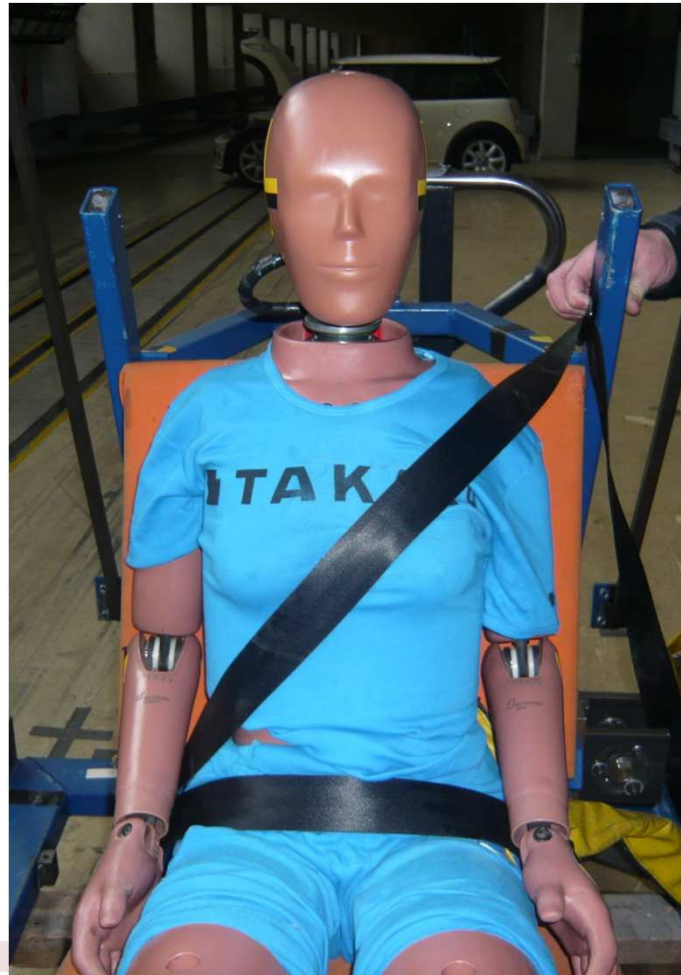
5th Percentile Dummy



Proposal

- NPACS anchorage points are in principle a good choice
- NPACS FWD upper anchorage point is very specific and should not be considered for regulation
- With P dummies a risk of belt slippage from the shoulder was recognised
- With Q dummies the shoulder belt tends to slip towards the neck
- For backless booster modification of upper anchorage lower or more outside is recommended
- For high back booster and later integral CRS upper anchor may be modified as proposed by Dorel

5th Percentile Dummy with lower upper Anchorage Point



INCOMPATIBILITY UNIVERSAL ISOFIX CRS IN UNIVERSAL ISOFIX CARS





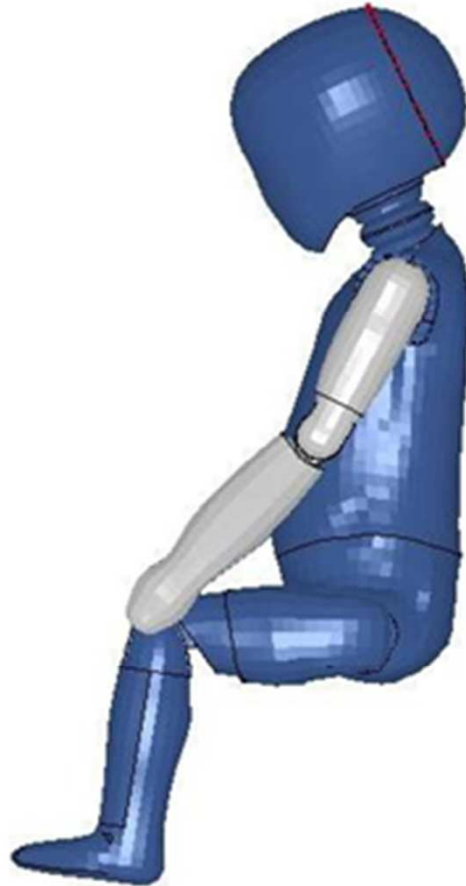






In addition several issues with the head rest possible

UNDERSTANDING PROBLEMS NEW REGULATION



Arms are aligned with sternum



Arms are not aligned with sternum