

WorldSID 50M.

PSI-03-11

Injury Criteria



Washington

09/06/2011

BMW Group



WorldSID 50M.

Contents

- Open questions
- Injury Criteria used in current protocols
- Injury Criteria used with ES2re
- Measurement capabilities of WorldSID 50M
- Preliminary Injury Limits for WorldSID 50M

WorldSID 50M.

Open questions

- Which method and variables will be used to generate the IRC (ISO WG6 has decided to use the Survival Method)? → NHTSA, ...
- Is there a quality criteria (data basis, best fit, ...) to be fulfilled before the IRC are used?
- Which AIS will be addressed?
- Which risk of injury will be addressed?
- Which age will be considered for the IRC construction?
- Which body regions are addressed by the injury criteria?

Open questions will be addressed at the next WebEx meeting of experts working on the IRC for WS05F.

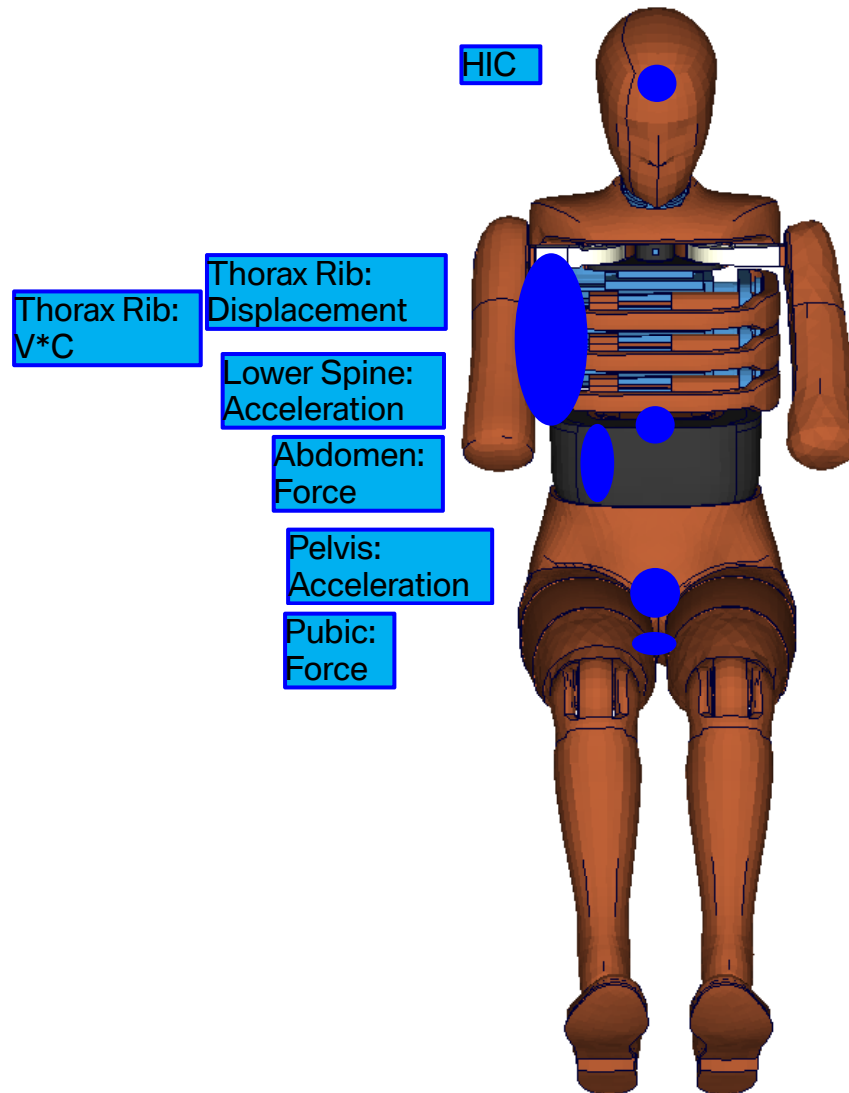
WorldSID 50M.

Injury criteria in current protocols

Body Region	Protocol	
	FMVSS 214	ECE R95
Head	HIC	HIC
Shoulder	-	-
Thorax	Displacement	Displacement
	-	V*C
Abdomen	Force	Force
Spine	Acceleration	-
Pelvis	Pubic Force	Pubic Force
	-	Acceleration

WorldSID 50M.

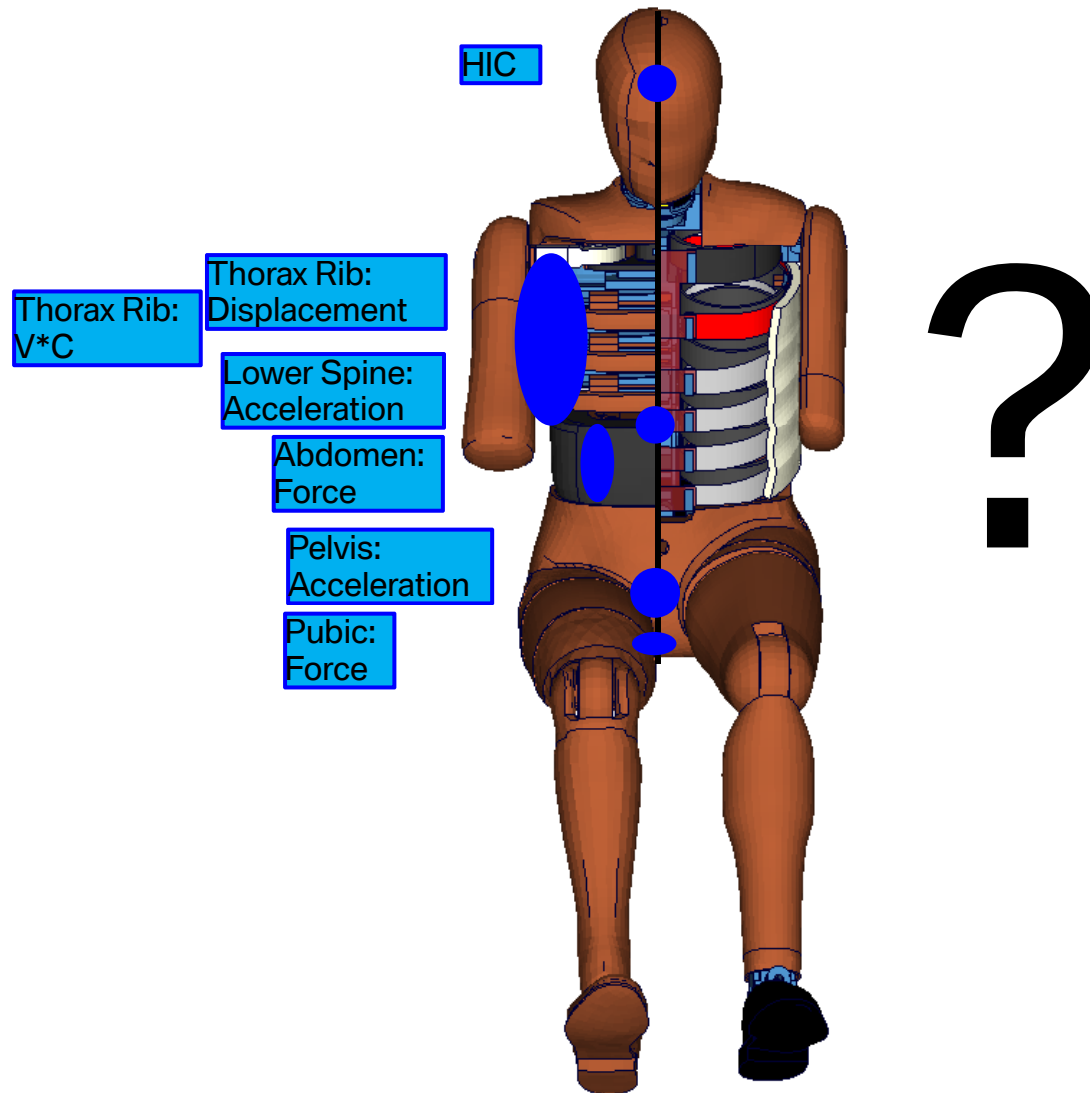
Injury criteria used with ES2re



Body Region	Injury Criteria
Head	HIC
Shoulder	-
Thorax	Displacement
	V*C
Abdomen	Force
Spine	Acceleration
Pelvis	Pubic Force
	Acceleration

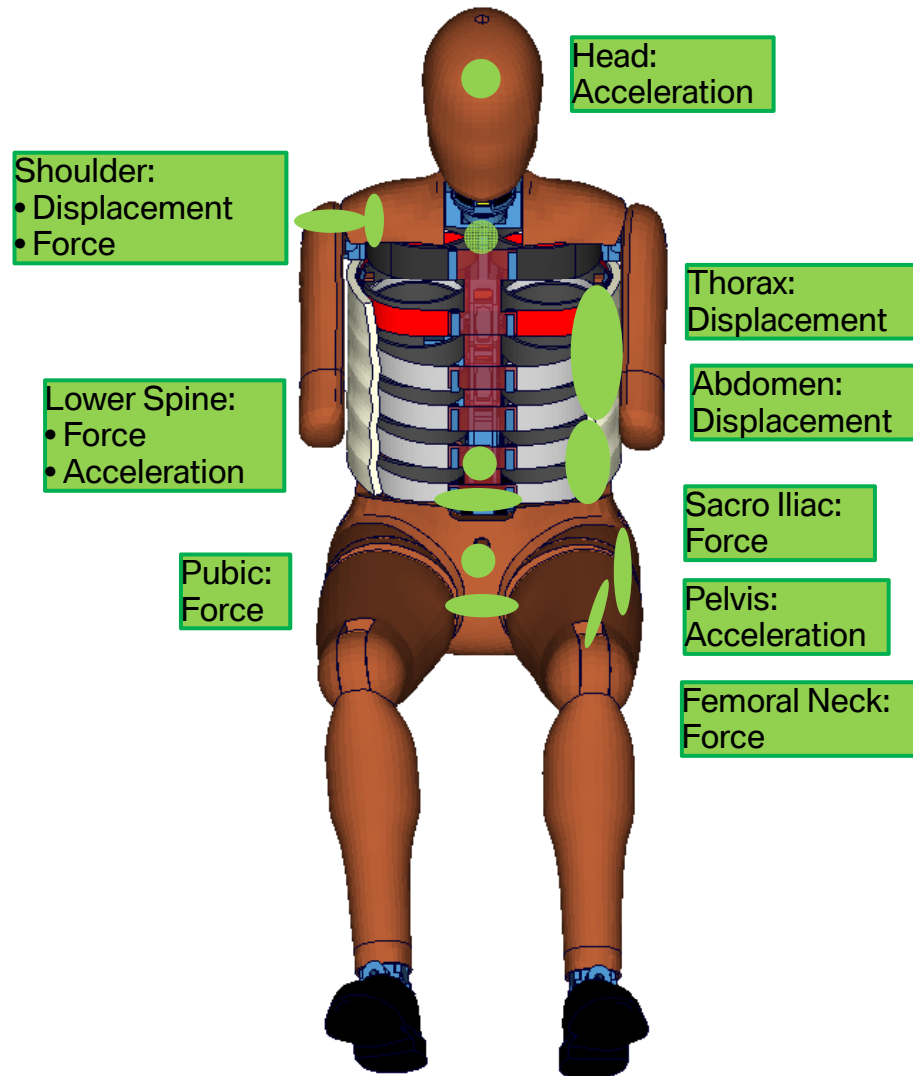
WorldSID 50M.

Injury criteria WorldSID 50M



WorldSID 50M.

Measurement capabilities WorldSID 50M



WorldSID 50M.

Preliminary Injury Thresholds for WorldSID 50M

INJURY CRITERIA FOR SIDE IMPACT DUMMIES

Left Panel (Blue Boxes):

- HIC
- Upper Spine: Acceleration
- Thorax Rib: Displacement
- Thorax Rib: $V \cdot C$
- Lower Spine: Acceleration
- Abdomen: Force
- Pubic: Force
- Pelvis: Acceleration

Right Panel (Green and Yellow Boxes):

- HIC
- Shoulder:
 - Displacement
 - Force
- Thorax Rib: Displacement
- Abdomen Rib: Displacement
- Lower Spine: Acceleration
- Pubic: Force
- Sacro Iliac: Force
- Pelvis: Acceleration
- Femoral Neck: Force

Additional Labels:

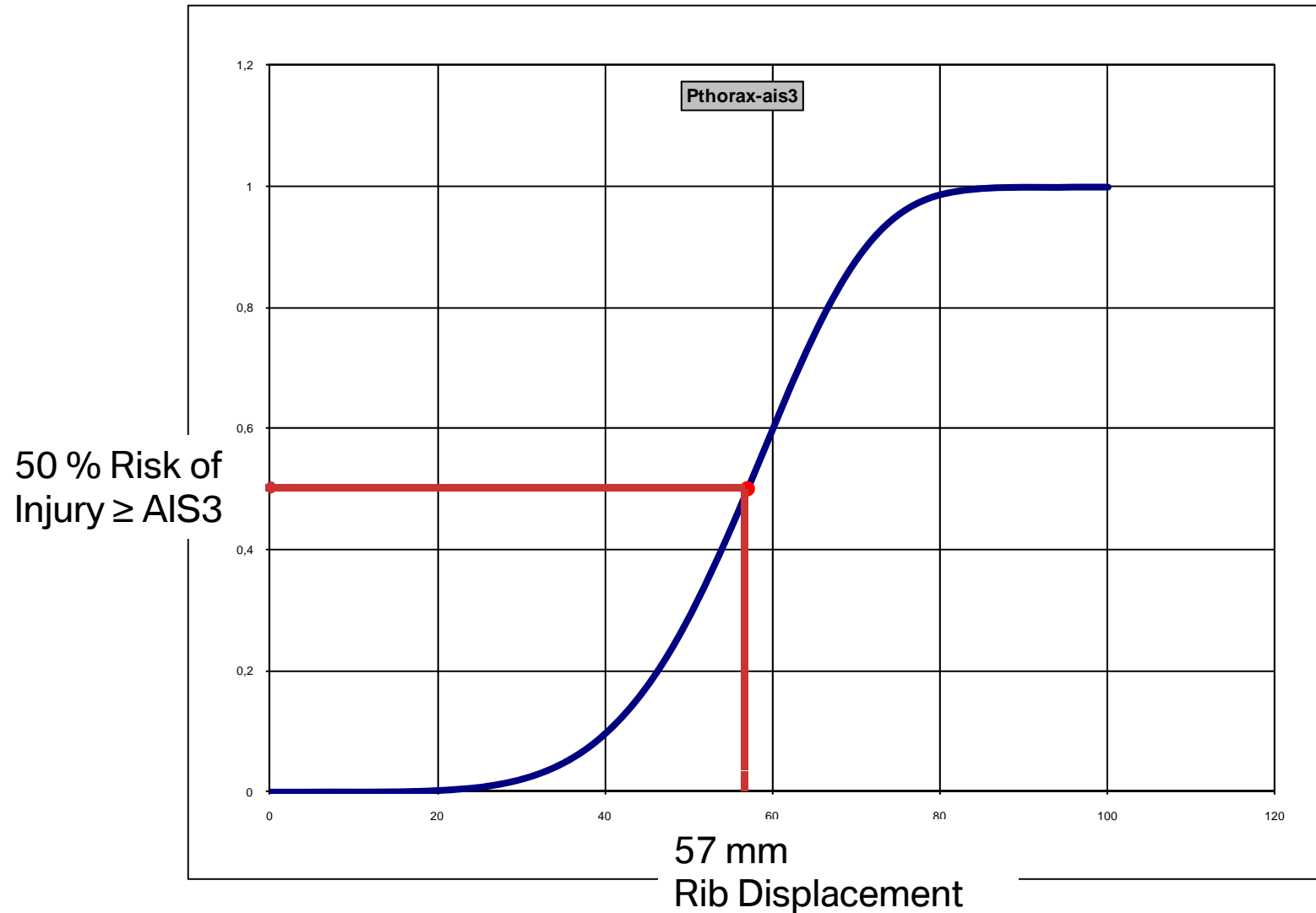
- Thorax Rib: $V \cdot C$
- Abdomen Rib: $V \cdot C$
- Abdomen Rib: $V \cdot C$
- occupant protection in side
- risques de blessures pour evaluer la protection des occupants en choc latéral

Logos: NHTSA (People Saving People, http://www.nhtsa.dot.gov), NTBR

WorldSID 50M.

Preliminary Injury Thresholds for WorldSID 50M

Assumption: 50% injury risk AIS3+ is used in regulation



WorldSID 50M.

Preliminary Injury Thresholds for WorldSID 50M

		Risk of Injury		
		50% \geq AIS 3		
		ES2 RE *	WS 50 *	* Survival Method (Weibul)
		* as used in FMVSS214		
Shoulder	Deflection	-	65 mm	AIS2
	Force	-	2560 N	AIS2
Thorax	Displacement	44 mm	57 mm	
	V*C	-	0,82	
Abdomen	Displacement	-	92 mm	
	V*C	-	1,64	
	Force	2800 N	-	
Lower Spine	Acceleration	80 g	75 g	
Pelvis	Pubic Force	7000 N	3120 N	
	Acceleration	-	111 g	

WorldSID 50M.

Preliminary Injury Limits for WorldSID 50M

How to proceed?

No final agreement on guidelines for building up IRC in the last meeting of ISO WG6. An agreement must be reached before any recommendation can be made. (next face2face meeting 11/2011)

Open questions will be addressed at the next WebEx meeting of experts working on the IRC for WS05F.

...

WorldSID 50M.

Preliminary Injury Limits for WorldSID 50M

		Risk for a 45 year old person								
Body region	Criterion	AIS2+			AIS3+			AIS4+		
		5%	25%	50%	5%	25%	50%	5%	25%	50%
Shoulder	Maximum shoulder rib deflection (mm)	39.1	57	69						
	Maximum shoulder force Y (N)	1705	2278	2640						
Thorax	Maximum thorax and abdomen rib deflection (mm)				40.6	50.6	57.6	73.5	101.3	126.7
	Maximum thorax and abdomen rib VC (m/s)				0.17	0.47	0.79	1.31	2.6	4.21
Abdomen	Maximum abdomen deflection (mm)	60	72.4	79.8	101.1	160.5	221.4			
	Maximum abdomen VC (m/s)	0.92	1.27	1.47	2.08	4.2	6.83			
	Lower spine acceleration 3ms (m/s ²)	488	632	721	673	848	995			
Pelvis	Maximum pubic force (N)	1842	2825	3644	2231	2957	3414			
	Pelvis acceleration 3ms (m/s ²)	505	817	1042	924	1469	1860			

All data for the age adjusted risks are calculated by regression on age and the distribution assumption with the best model fit (based on the AIC value)

WorldSID 50M.

Thank you!

