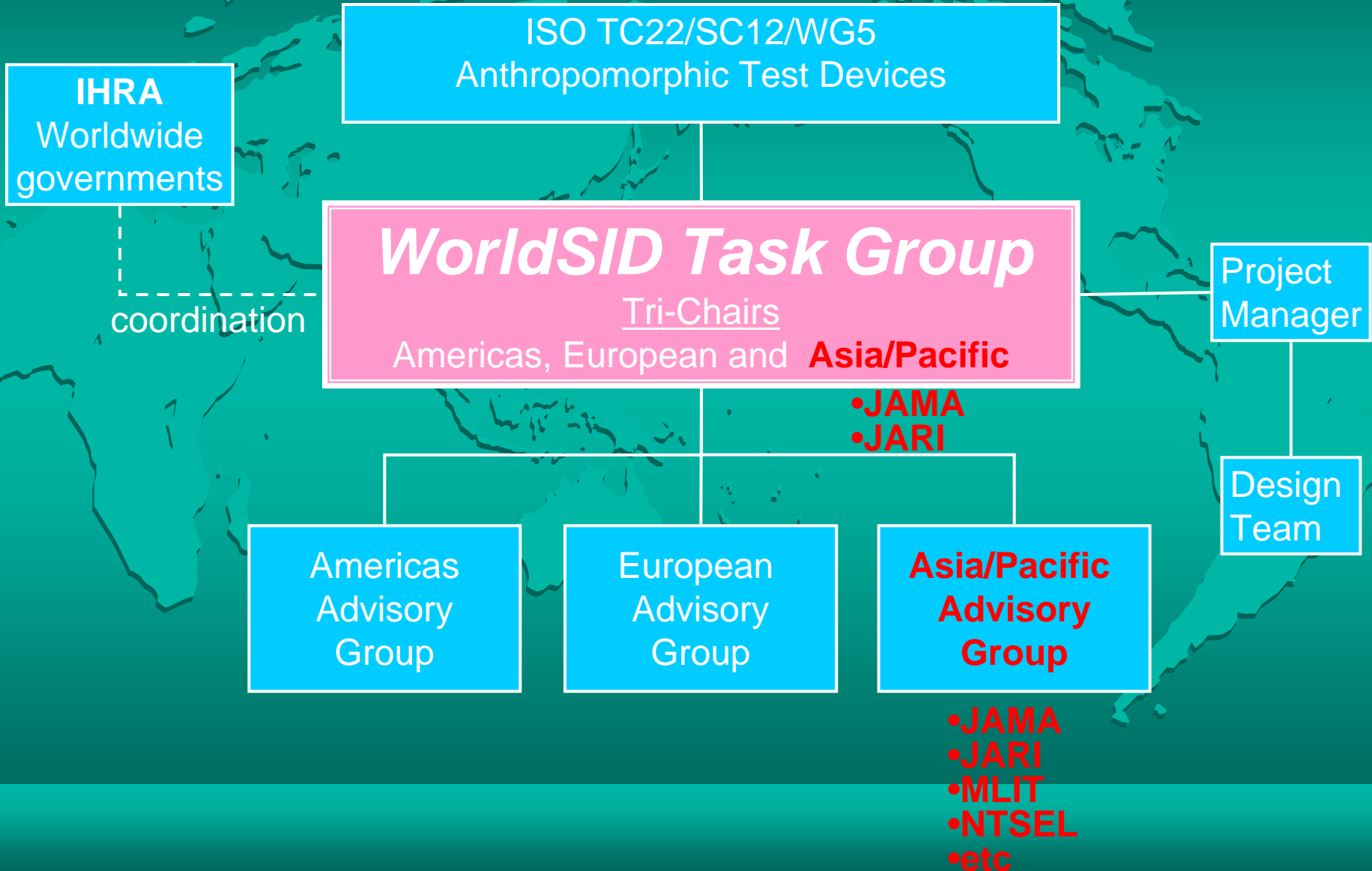


# JAMA/JARI Evaluation Tests of The WorldSID 5<sup>th</sup> Dummy

# WorldSID Project Organization



# Evaluation of the WorldSID 50th



- **2003 – 2004 (Pre-Production)**
  - Biofidelity Evaluation Test (Except Head)
  - Verification Test (Except Head and Neck)
- **2004 – 2005 (Pre-Production)**
  - Positioning Study
  - Full-Vehicle Crash Test with Vehicle A (4dr SD)
    - ECE R95, FMVSS214, AE-MDB, Car-to-Car (Stationary)
  - Head and Neck Verification Test
- **2005 – 2006 (Production)**
  - Full-Vehicle Crash Test with Vehicle A (4dr SD)
    - FMVSS214 (Drivers Position and Rear Passengers Position)
  - 30deg. Oblique Pendulum Impact to Upper Torso
  - Full-Vehicle Crash Test with Vehicle B (4dr SD)
    - Car-to-Pole (75deg. Oblique Pole)
- **2006 – 2007 (Production)**
  - Full-Vehicle Crash Test Vehicle C (5dr HB)
    - ECE R95, FMVSS214 (Rear Passengers Position)
    - Car-to-Pole (75deg. Oblique Pole)
- **2007 – 2008 (Production Rev.1)**
  - Full-Vehicle Crash Test Vehicle C (5dr HB)
    - FMVSS214 (Drivers Position)

# Evaluation of the WorldSID 5th



- 2008 – 2009 (Prototype Rev.1)
  - Biofidelity Evaluation
    - Shoulder Impact
    - Thorax Impact
  - Full-Vehicle Crash Test Vehicle C (5dr HB)
    - FMVSS214(Rear Passengers Position)

A world map with a light beige background and dark brown outlines of continents, centered on the Atlantic Ocean. The map is slightly faded and serves as a background for the text.

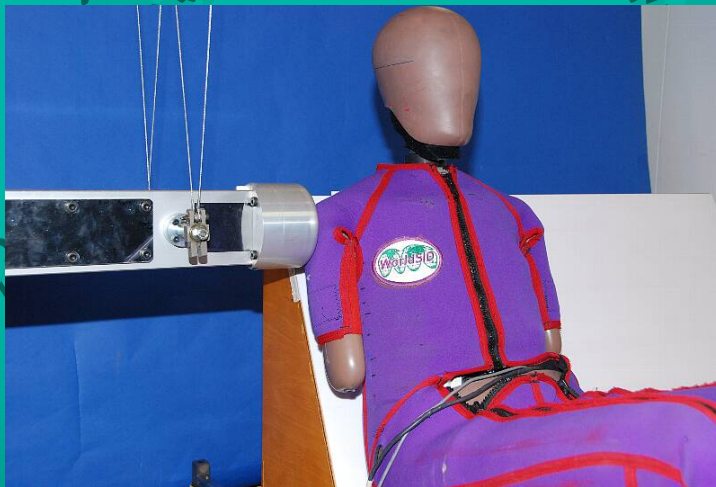
# WorldSID 5th Biofidelity Test

Shoulder 4.5m/s lateral impact

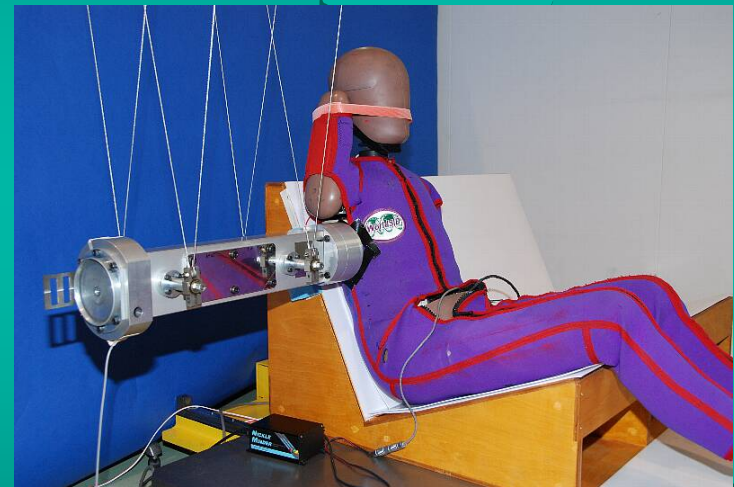
Thorax 4.3m/s lateral impact

## < Test condition >

	Impact point	Item
Shoulder impact 4.5m/s lateral impact	Shoulder Pivot (Arm Down)	Impactor Force (CFC1000) Shoulder Deflection (CFC600)
Thorax impact 4.3m/s lateral impact	Mid Point of 2 <sup>nd</sup> Thorax Rib (Arm Up)	Impactor Force (FIR100) T1 Lateral Acceleration (FIR100)



Shoulder impact

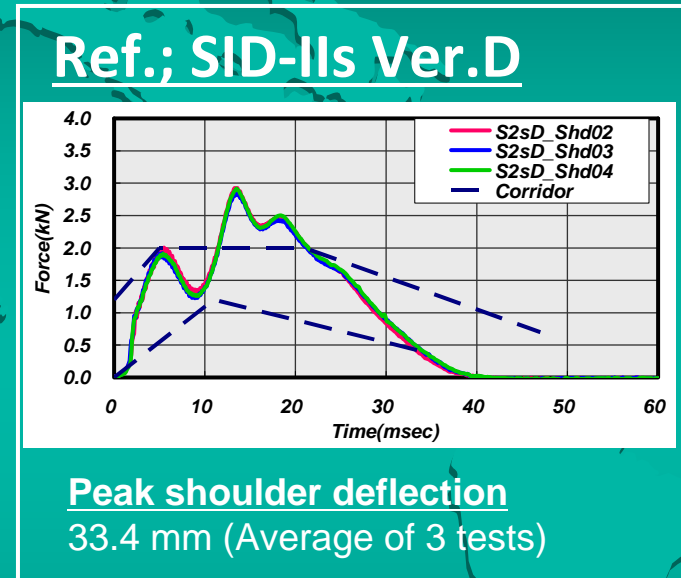
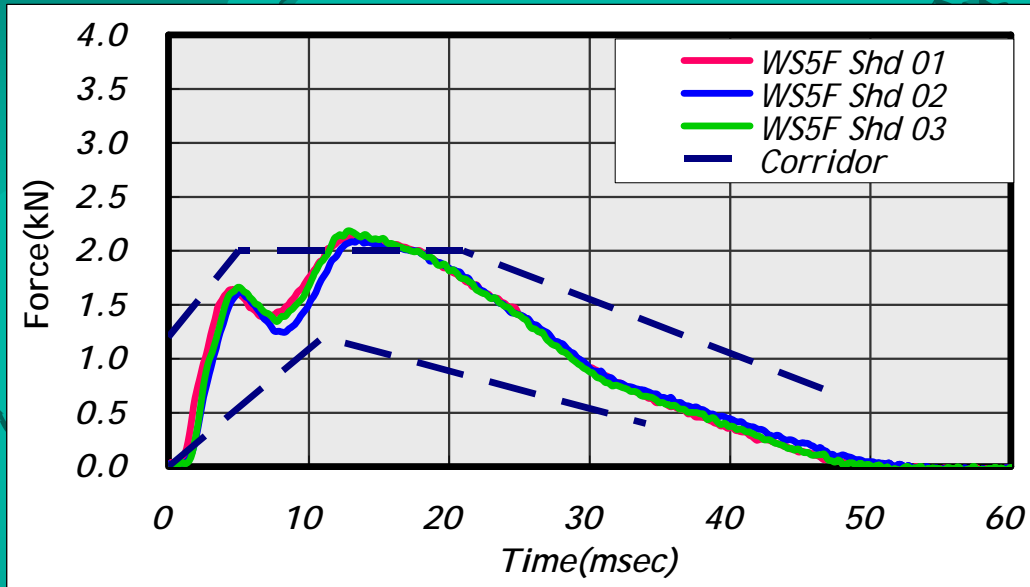


Thorax impact

- Impactor ; m=14kg, 120mm Diameter, Flat Face(12.7mm radius edge)
- Response corridor ;, A.L. Irwin et al, "Guidelines for Assessing the Biofidelity of Side Impact Dummies of Various Sizes and Ages", SAE2002-22-0016, 46th STAPP.

# < Test results - Shoulder 4.5m/s impact >

## Impactor force - time response ;



## Peak shoulder deflection

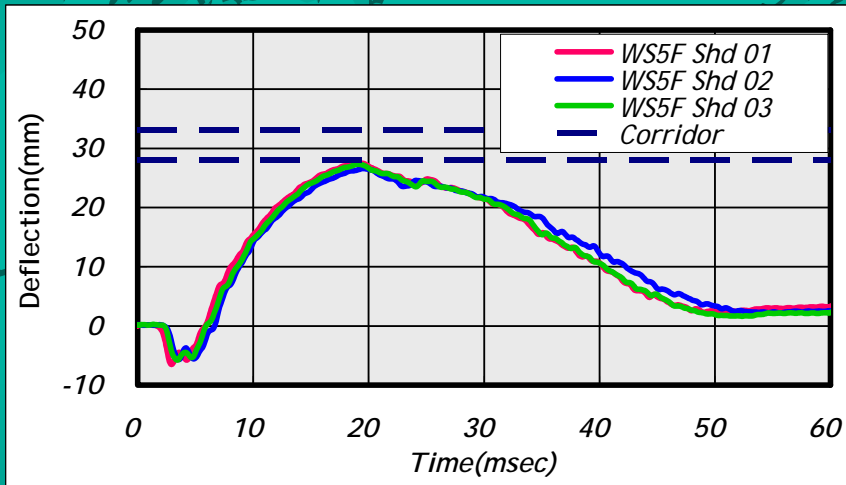
	Lower Bound	Upper Bound	WS5F Shd 01	WS5F Shd 02	WS5F Shd 03	Average
Peak Shoulder Defl. (mm)	28	33	27.4	26.6	27.3	27.1

\* Shoulder potentiometer might be broken.

# < Test results - Shoulder 4.5m/s impact >

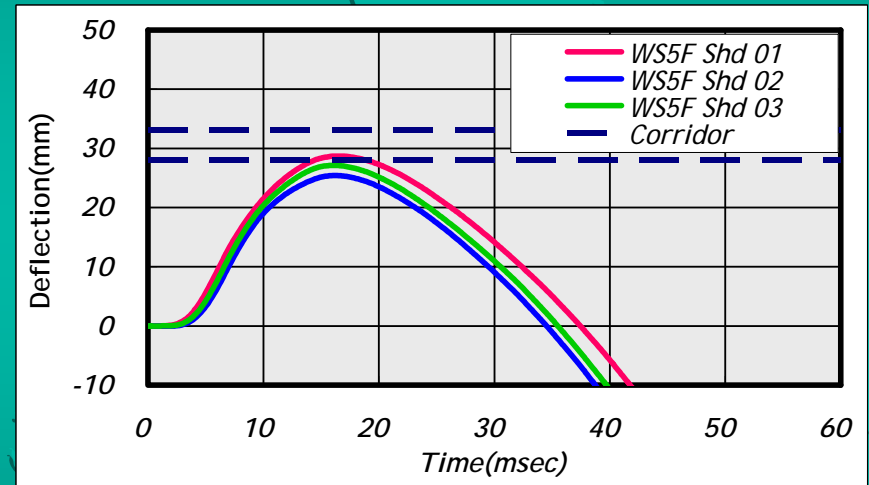
## Shoulder Deflection

### Potentiometer



Lower Bound	Upper Bound	WS5F Shd 01	WS5F Shd 02	WS5F Shd 03	Average
28	33	27.4	26.6	27.3	27.1

### Relative Disp - Shoulder Rib to T1 (Double Integration of Acceleration)

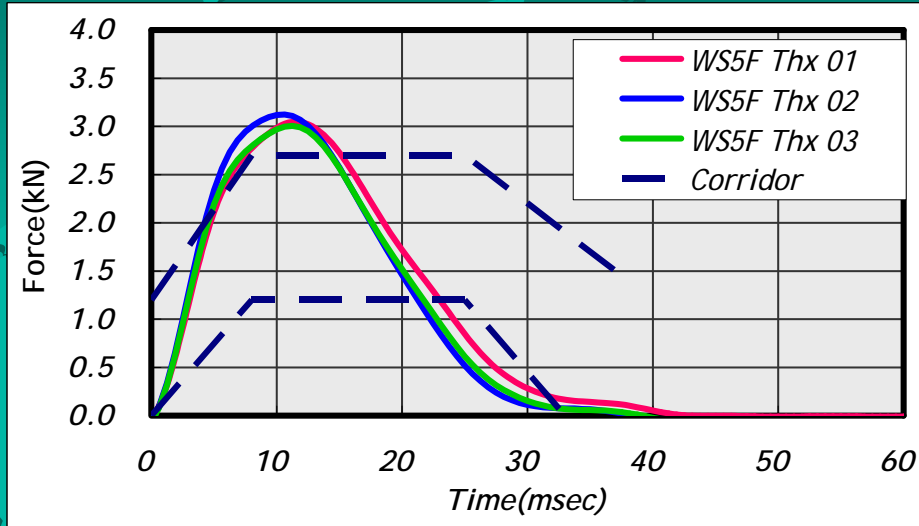


Lower Bound	Upper Bound	WS5F Shd 01	WS5F Shd 02	WS5F Shd 03	Average
28	33	26.4	24.7	26.1	25.7

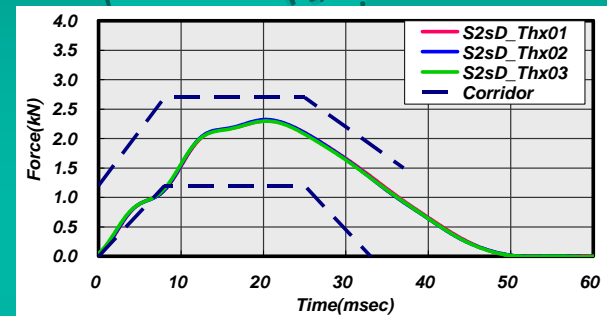


# < Test results – Thorax 4.3m/s impact >

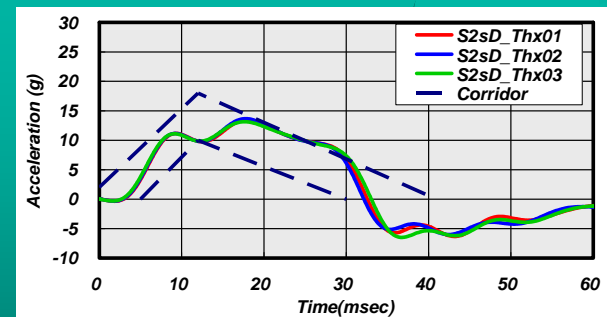
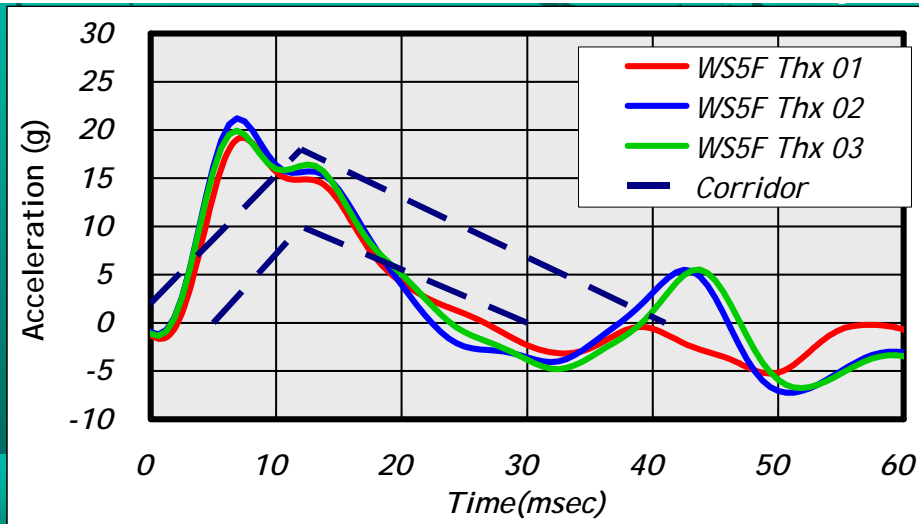
## Impactor force - time response



## Ref.; SID-IIs Ver.D



## T1 lateral acceleration - time response



A stylized world map in shades of blue and green, centered on the Atlantic Ocean, serving as a background for the text.

# WorldSID 5th Full-Scale Test

Test configuration ; FMVSS 214

Test Vehicle ; Small Size 5-door Hatchback with SAB&CSA

# Full-scale Test

## < Test configuration & Condition of test vehicle >

Test configuration ; FMVSS 214

Dummy

Fr. : Mid Male Size (ES-2re or WorldSID 50M)

Rr. : Small Female Size (WorldSID 5th or SID-IIs SBL-D)

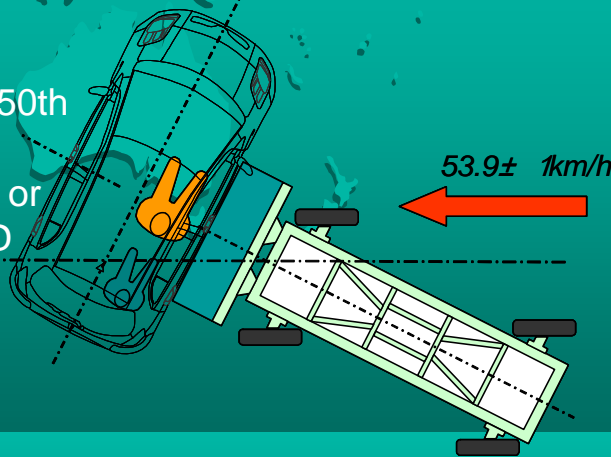
Test Vehicle ; Small Size 5-door Hatchback with SAB&CSA

Deployed impact side SAB&CSA

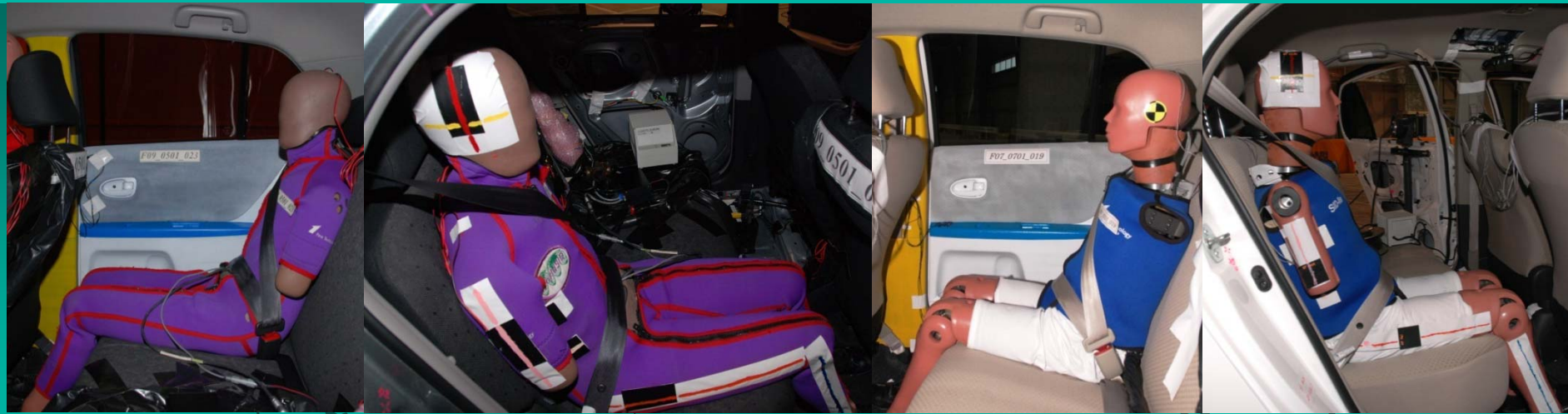
Vehicle mass ; 1,136kg include dummies & Data Acquisition System

Fr; ES-2re or  
WorldSID 50th

Rr; WorldSID 5th or  
SID-IIs SBL-D



# < Test set-up on rear seat dummy >



WorldSID 5th F09_0501_023	Dummy Test No.	SID-IIs SBL-D F07_0701_019
-1	Tilt-angle (degree)	Head
(Top of the lower neck bracket is 0deg = 21.6deg)		Torso
23	Dummy H.P. relative to reference H.P. (mm)	Pelvis
38		X
0		Y
-13		Z

Positive direction : X=Rear, Y=Right, Z=Up

# < Picture from the onboard video camera >

– Top ; WorldSID 5th , Bottom ; SID-IIs SBL-D



20msec

40msec

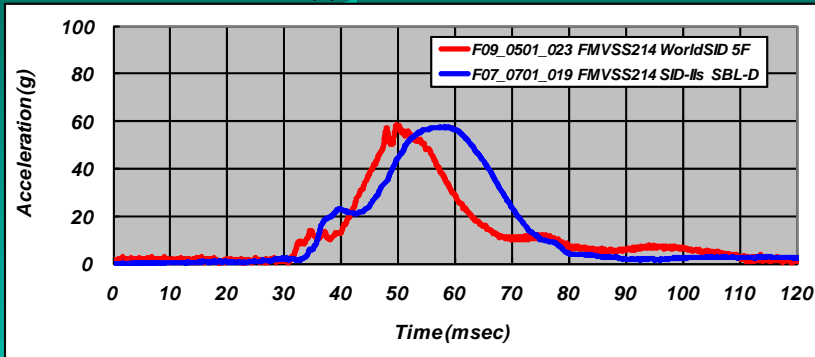
60msec



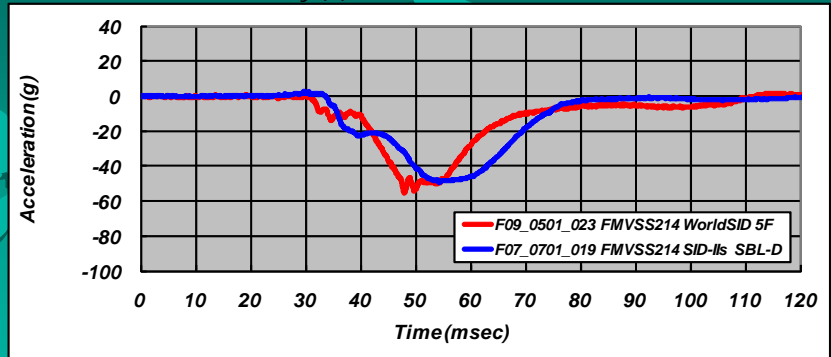
# < Dummy response >

– Head / Red ; WorldSID 5th , Blue ; SID-IIs SBL-D

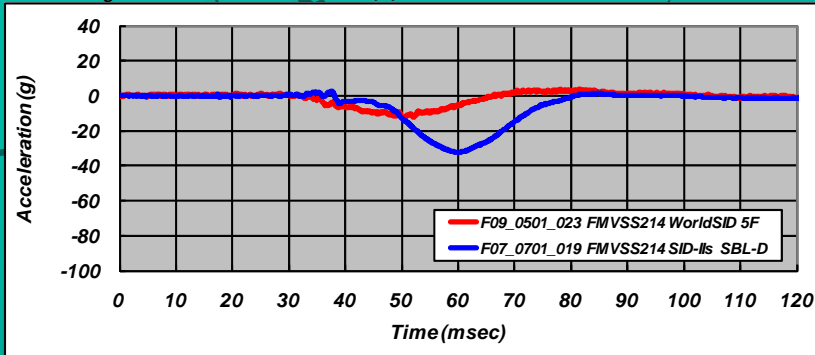
Head Resultant Acceleration (G) CFC1000



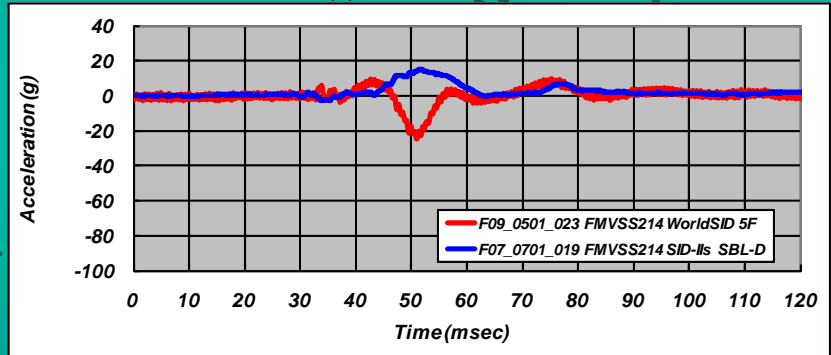
Head Lateral Acceleration Ay (G) CFC1000



Head Longitudinal Acceleration Ax (G) CFC1000



Head Vertical Acceleration Az (G) CFC1000



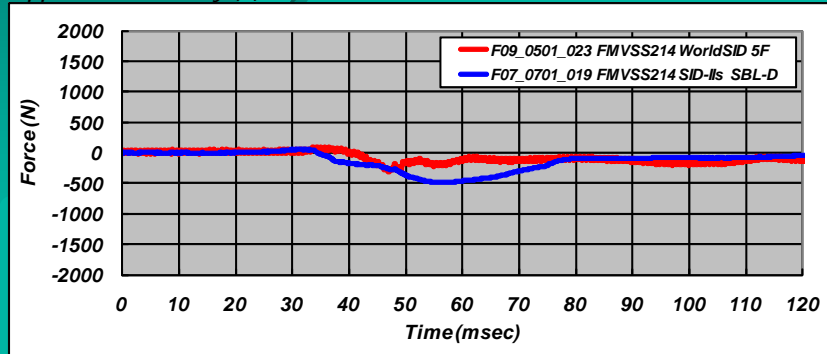
## ➤ HIC36

- WorldSID 5th ; 238(43~61msec)
- SID-IIs ; 351

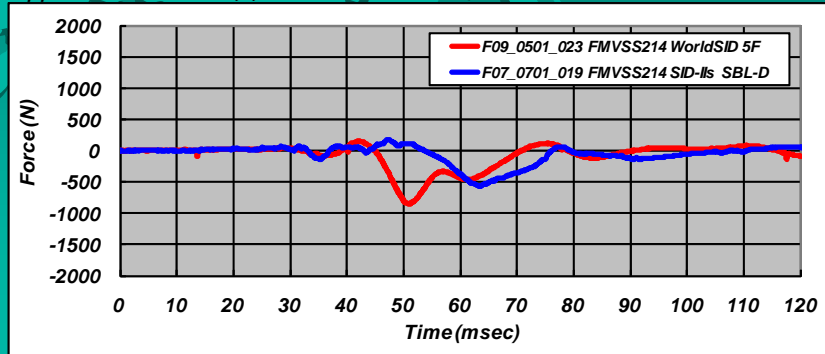
# < Dummy response >

– Upper Neck / **Red ; WorldSID 5F** , **Blue ; SID-IIs SBL-D**

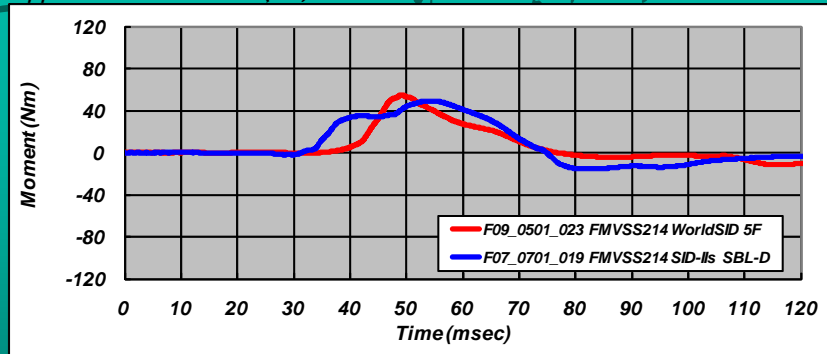
Upper Neck Force Fy (N) CFC1000



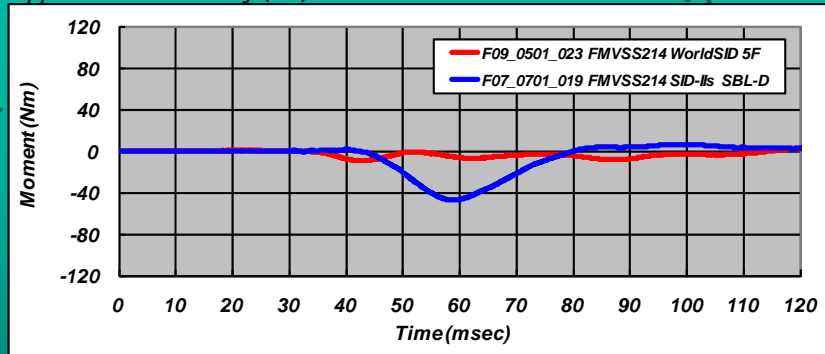
Upper Neck Force Fz (N) CFC1000



Upper Neck Moment Mx (Nm) CFC600



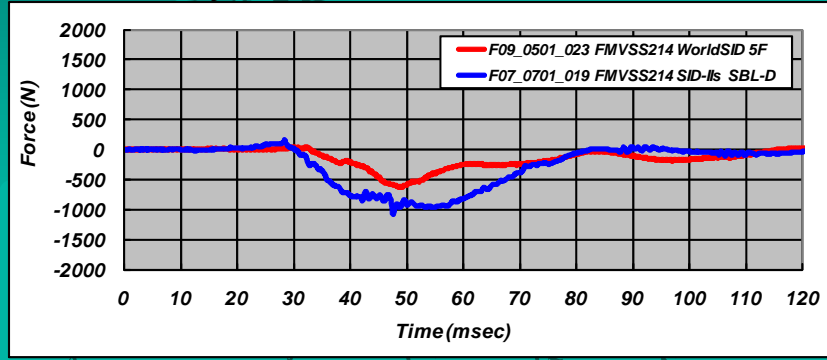
Upper Neck Moment My (Nm) CFC600



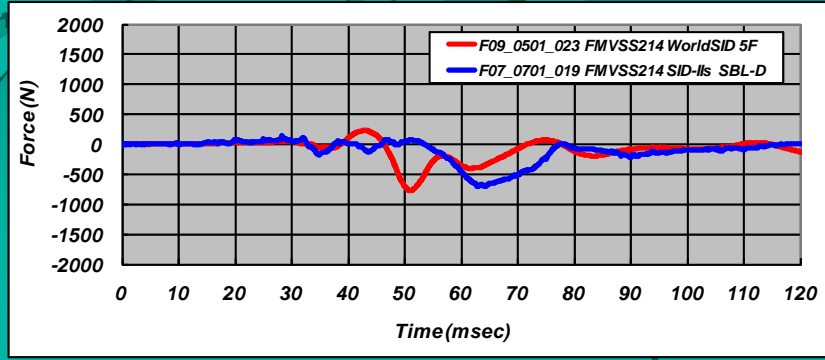
# < Dummy response >

- Lower Neck/ Red ; WorldSID 5F , Blue ; SID-IIs SBL-D

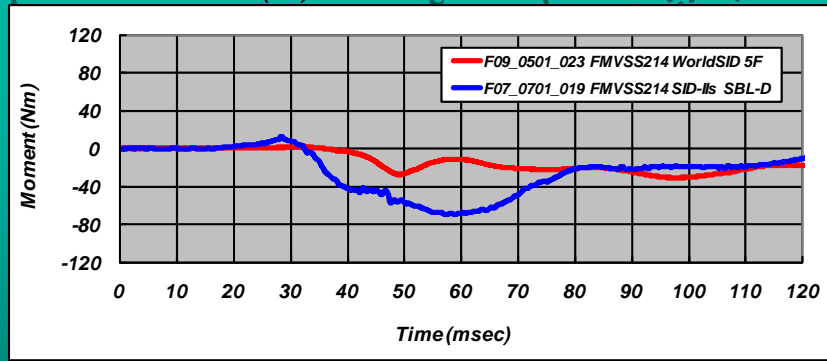
Lower Neck Force Fy (N) CFC1000



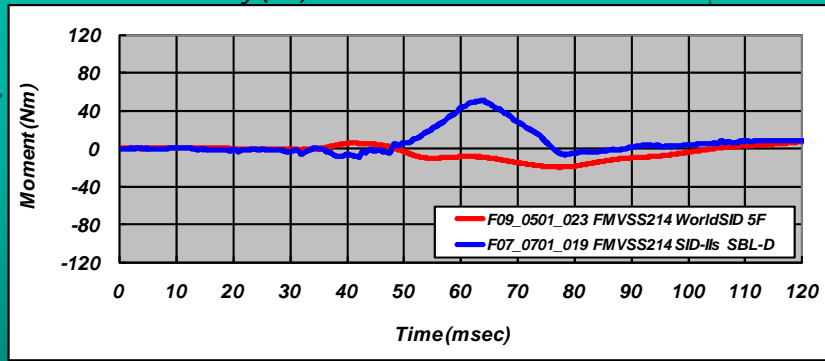
Lower Neck Force Fz (N) CFC1000



Lower Neck Moment Mx (Nm) CFC600



Lower Neck Moment My (Nm) CFC600

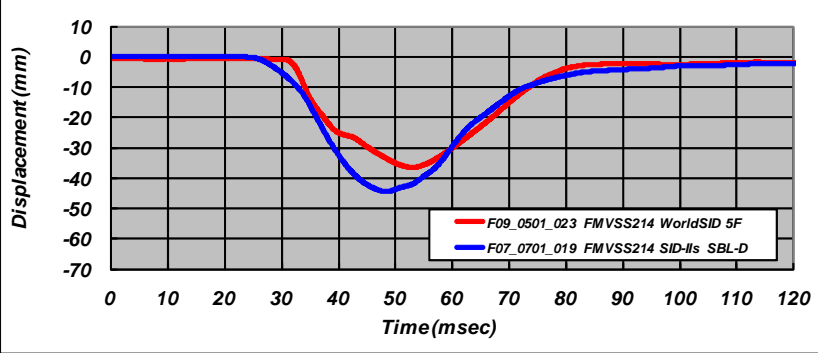




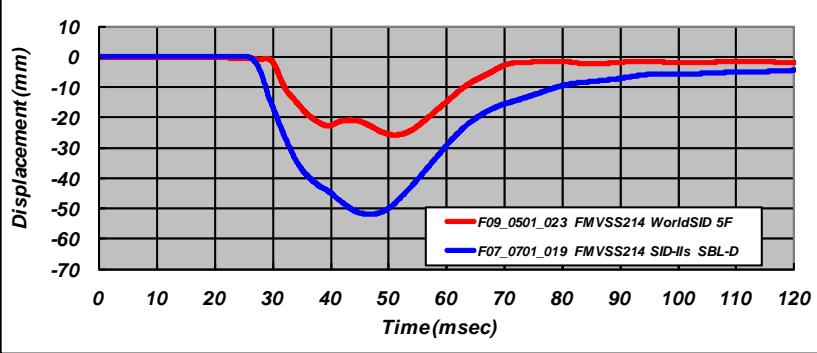
# < Dummy response >

– Thorax and Abdominal Disp. / **Red ; WorldSID 5F** , **Blue ; SID-IIs SBL-D**

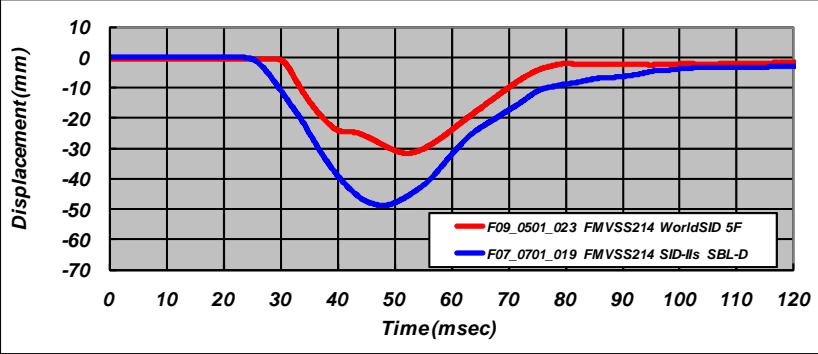
Thorax Rib 1 Displacement Dy (mm) CFC180



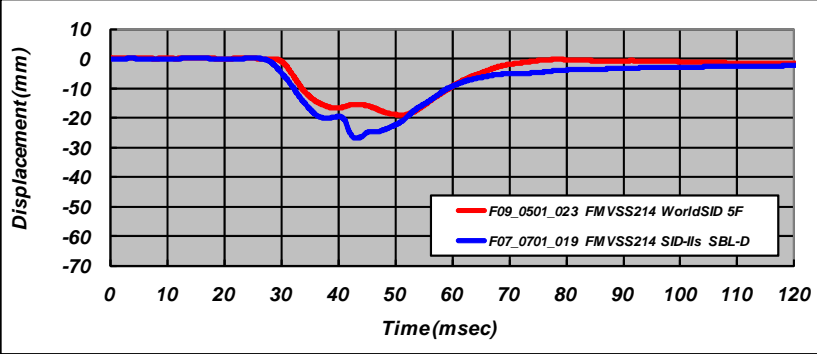
Abdominal Rib 1 Displacement Dy (mm) CFC180



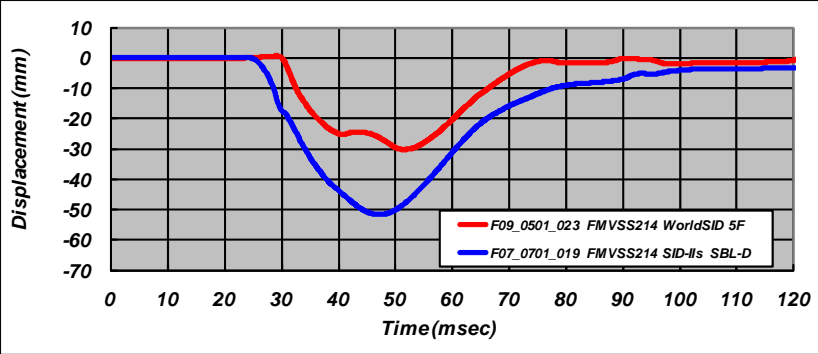
Thorax Rib 2 Displacement Dy (mm) CFC180



Abdominal Rib 2 Displacement Dy (mm) CFC180



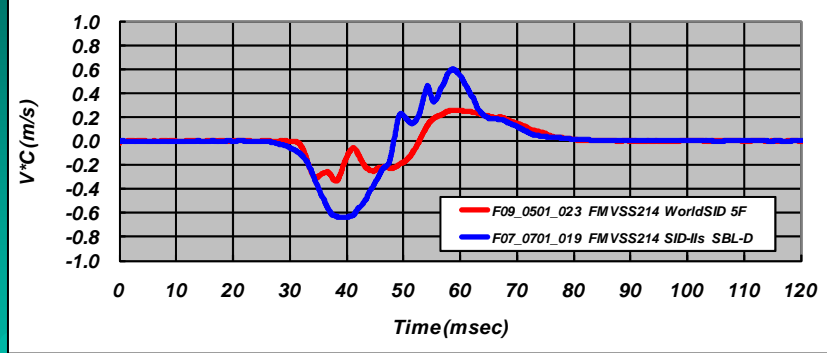
Thorax Rib 3 Displacement Dy (mm) CFC180



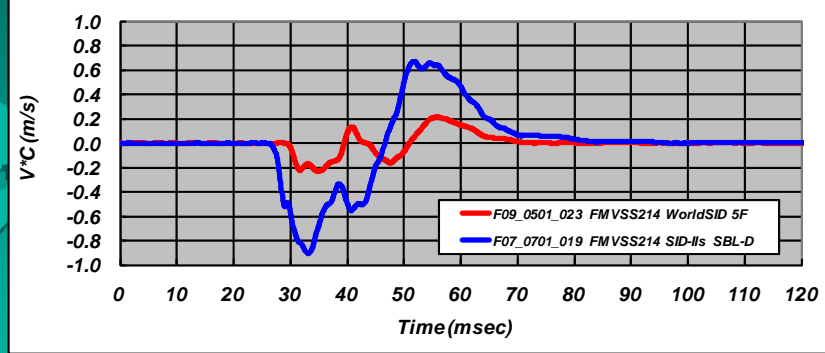
# < Dummy response >

– Thorax and Abdominal V\*C / Red ; WorldSID 5F , Blue ; SID-IIs SBL-D

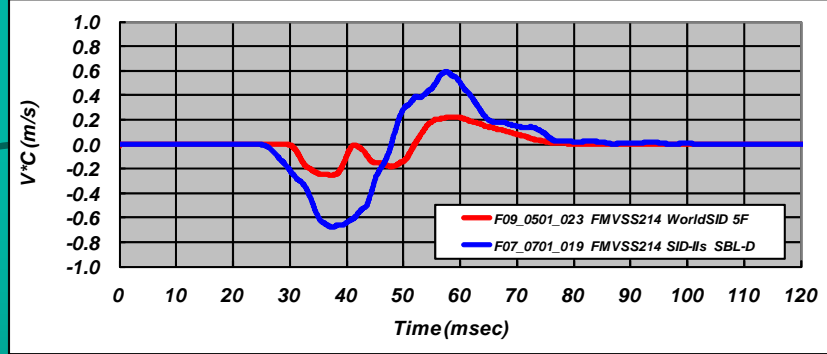
Thorax Rib 1 V\*C (m/s) CFC180



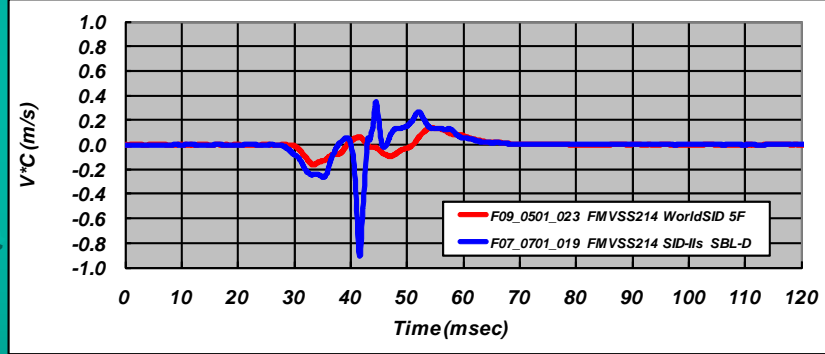
Abdominal Rib 1 V\*C (m/s) CFC180



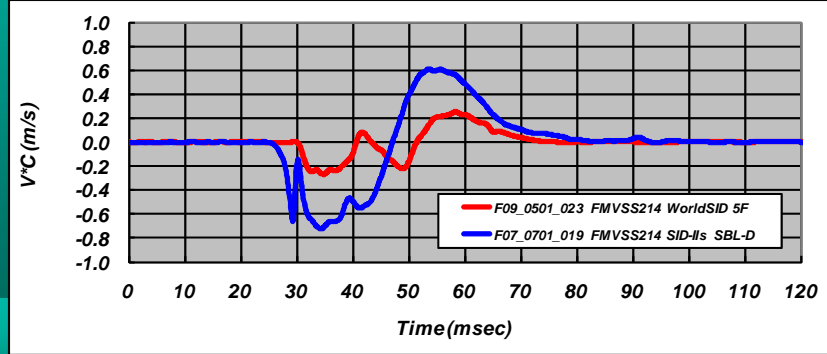
Thorax Rib 2 V\*C (m/s) CFC180



Abdominal Rib 2 V\*C (m/s) CFC180

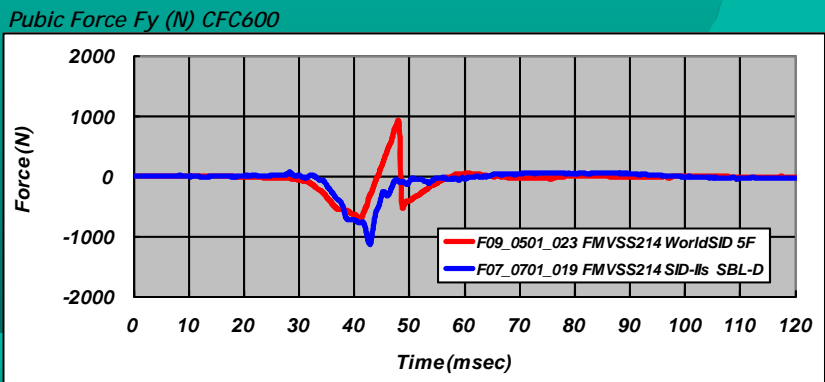
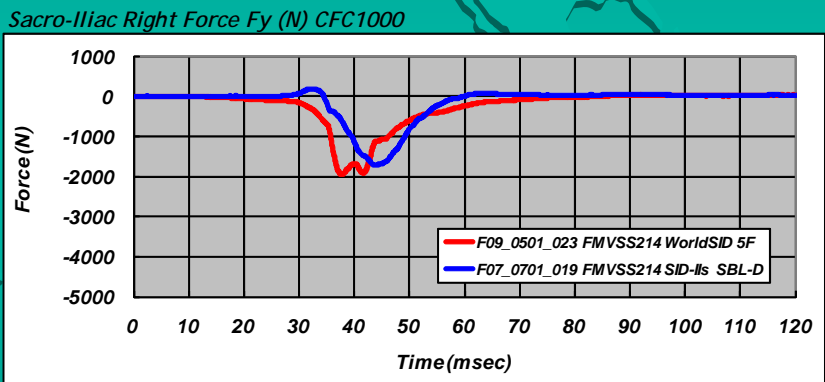
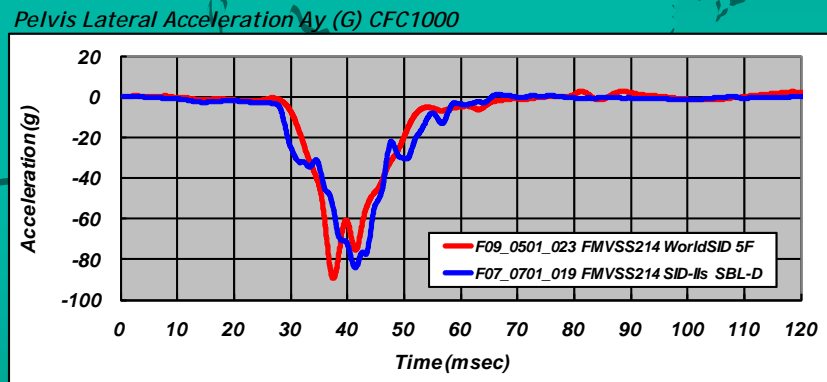
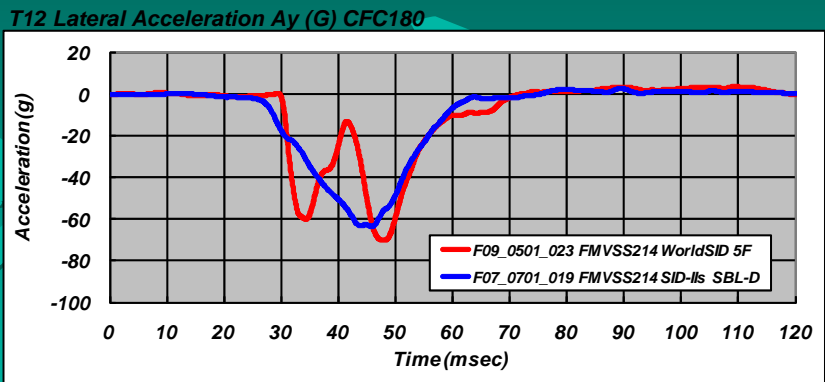
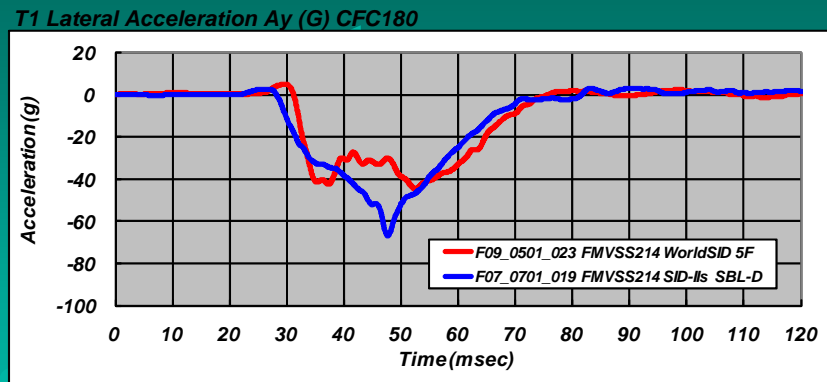


Thorax Rib 3 V\*C (m/s) CFC180



# < Dummy response >

- T1, T12, Pelvis and Iliac / Red ; WorldSID 5F , Blue ; SID-IIs SBL-D



➤ The pubic force of WorldSID 5th was damaged to the cable after 40msec.



**END**