

# Chestband Contours and Dummy Instrumentation Deflections from Biofidelity Tests

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Presentation to WorldSID 5<sup>th</sup> TEG

2/2/2022

# Thorax Body Region Scores Presented to WS 5th TEG 11/17/2021

Body Region	Test Condition	Measurement	PMHS Avg	PMHS Max	WorldSID-05F		SID-IIs	
			Phase Shift (ms)	Phase Shift (ms)	SM	Phase Shift (ms)	SM	Phase Shift (ms)
Thorax	2.5 m/s Shaw Lateral Impact	Impactor Force	1.5	3.2	6.5	3.7	2.6	2.8
		Chest Band Deflection	2.4	4.9	1.3	8.2	5.1	7.7
		Test Condition Avg.			3.9		3.9	
	2.5 m/s Shaw Oblique Impact	Impactor Force	3.5	7.0	5.8	13.7	2.0	5.8
		Chest Band Deflection	3.4	6.7	3.0	4.5	1.7	4.3
		Test Condition Avg.			4.4		1.8	
	4.5 m/s Rhule Lateral Impact	Impactor Force	1.9	3.1	5.8	8.3	3.4	5.7
		Chest Band Deflection	1.7	2.1	0.7	8.4	0.7	9.1
		Test Condition Avg.			3.3		2.1	
	4.5 m/s Rhule Oblique Impact	Impactor Force	1.7	3.3	5.7	3.6	3.0	2.5
		Chest Band Deflection	1.9	3.8	4.2	5.0	1.3	5.4
		Test Condition Avg.			4.9		2.1	
	6.7 m/s Rigid-Wall Sled Test	Thorax Plate Force	3.1	6.3	3.3	14.2	3.1	5.1
		Upper Thorax Deflection	2.2	4.3	3.0	4.0	1.2	7.9
		Lower Thorax Deflection	2.3	4.3	0.7	11.1	0.3	9.4
		T1 Y-axis Acceleration	2.8	5.9	1.2	11.8	1.9	4.1
		T12 Y-axis Acceleration	1.9	2.3	1.6	7.3	1.4	1.0
		Test Condition Avg.			2.0		1.6	
	6.7 m/s Padded-Wall Sled Test	Thorax Plate Force	4.7	9.2	1.2	13.8	0.9	10.7
		Upper Thorax Deflection	4.6	6.9	2.6	4.1	2.0	15.8
		Lower Thorax Deflection	5.4	10.6	1.2	14.6	1.4	12.5
		T1 Y-axis Acceleration	6.4	9.7	0.9	4.0	0.9	8.5
		T12 Y-axis Acceleration	4.3	8.3	0.9	9.1	1.2	2.7
		Test Condition Avg.			1.4		1.3	
	8.9 m/s Padded-Wall Sled Test	Thorax Plate Force	3.1	6.0	1.7	12.8	0.5	4.1
		Upper Thorax Deflection	5.9	7.7	2.9	-0.9	1.9	4.7
		Lower Thorax Deflection	4.1	8.3	0.7	10.7	2.0	10.5
		T1 Y-axis Acceleration	3.6	7.5	0.3	6.4	0.4	3.2
		T12 Y-axis Acceleration	2.0	3.5	1.0	9.6	0.7	2.1
		Test Condition Avg.			1.3		1.1	
Thorax Avg.				3.0		2.0		

**SM = BRS score**

Chestband contours, chestband deflections, and dummy instrumentation deflections for SID-IIs BLD and WorldSID-5<sup>th</sup> Mod Kit dummies in biofidelity tests

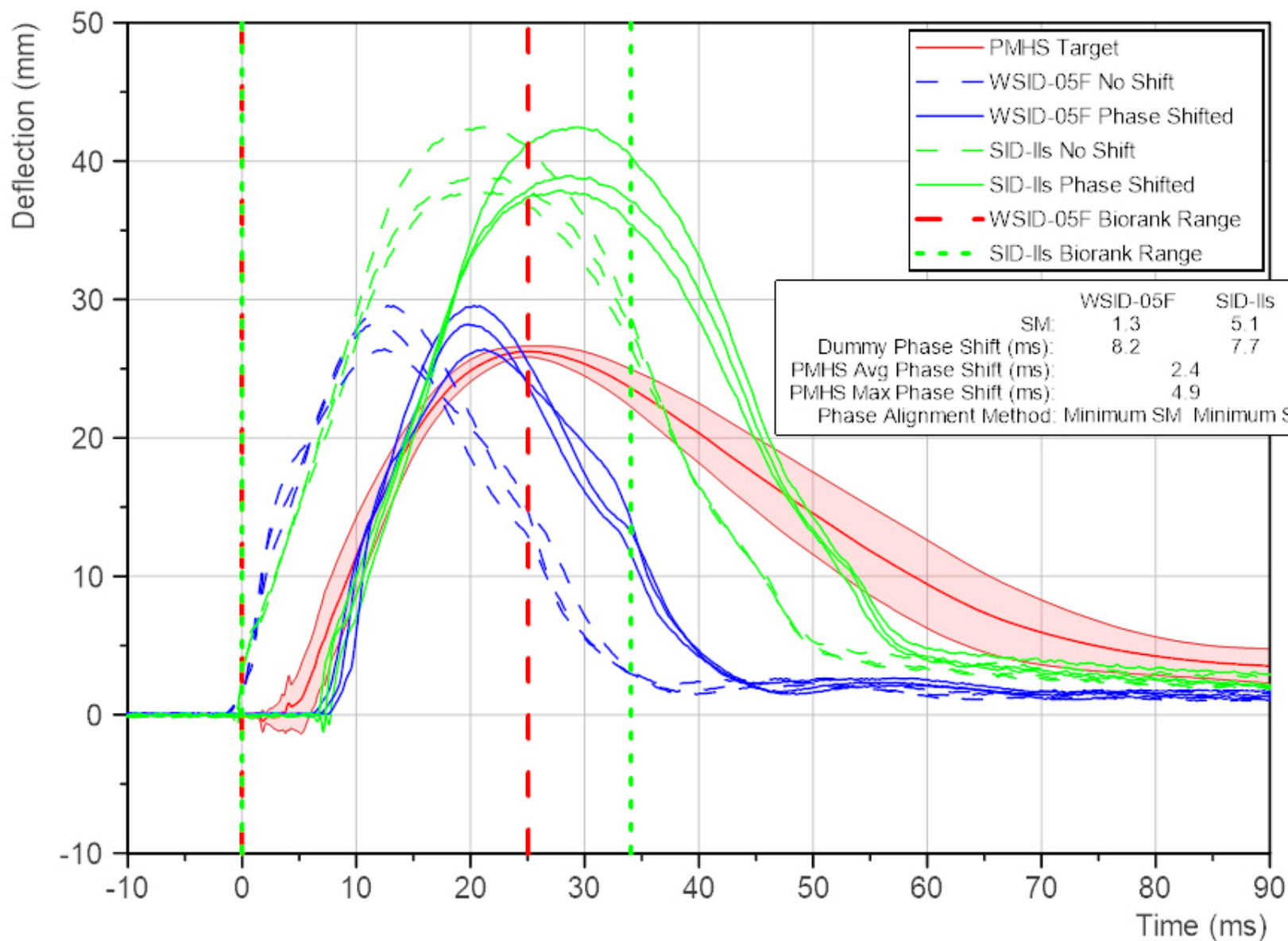
# Chestbands used for biofidelity tests

- 3 chestbands on PMHS and dummies for sled tests: top (axilla), middle (xiphoid), and bottom (abdomen)
- Biofidelity assessment calls top band “upper”, middle band “lower”, and bottom band “abdomen”
- Chestbands on dummies were placed over the jacket on thorax ribs 1 and 3, and between abdomen ribs 1&2

Body Region Biofidelity	Tests	Chestbands
Thorax	Shaw lateral Shaw oblique Rhule lateral Rhule oblique 6.7 m/s padded flat wall 6.7 m/s rigid flat wall 8.9 m/s padded flat wall	At impact location (1) At impact location (1) At impact location (1) At impact location (1) Top/upper, Middle/lower Top/upper, Middle/lower Top/upper, Middle/lower
Abdomen	6.7 m/s padded flat wall 6.7 m/s rigid flat wall 8.9 m/s padded flat wall 6.7 m/s rigid abdomen offset	Bottom/abdomen Bottom/abdomen Bottom/abdomen Bottom/abdomen

# Shaw Lateral Impact Test

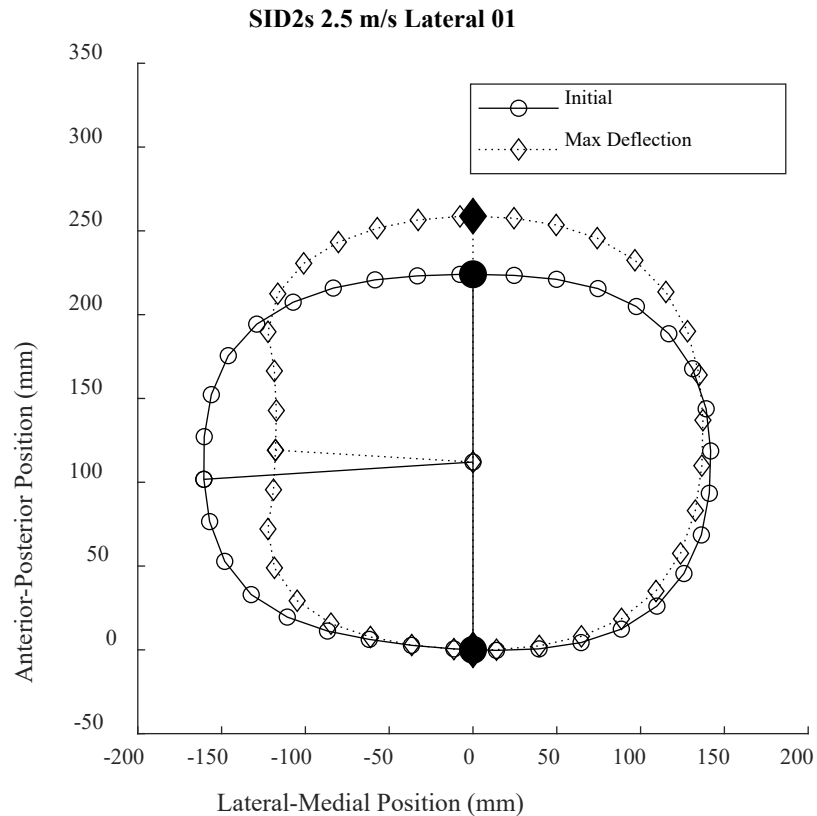
2.5 m/s Shaw Lateral Impact Test  
Chest Band Deflection (CFC1000)



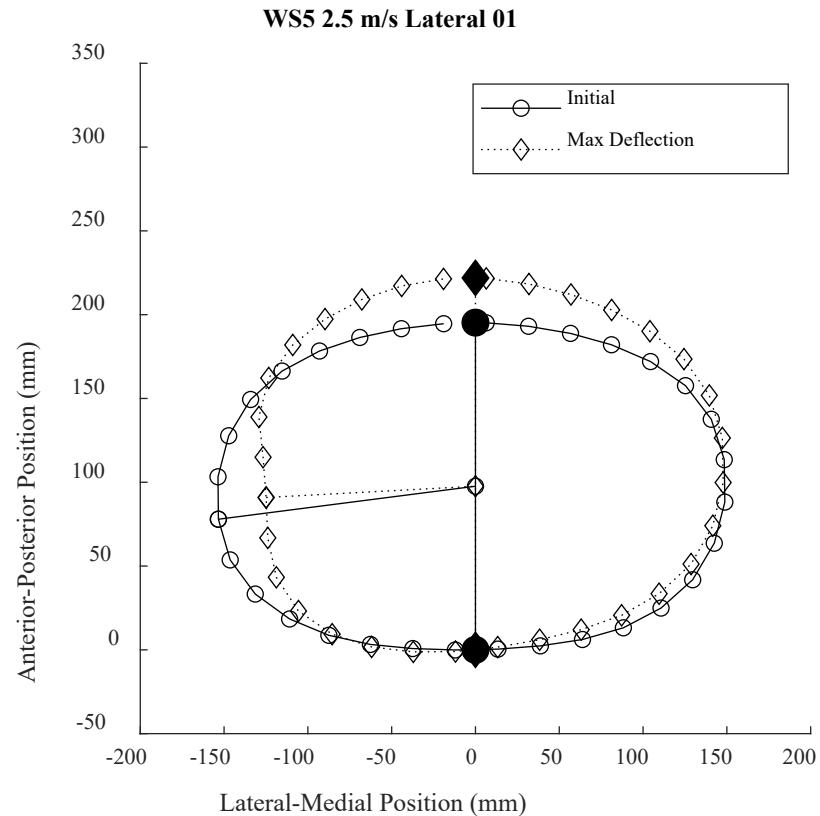
WS-05F 1.8  
SID-IIs 13.7  
Peak only

# Shaw (2.5 m/s) lateral impactor test

## Test 1



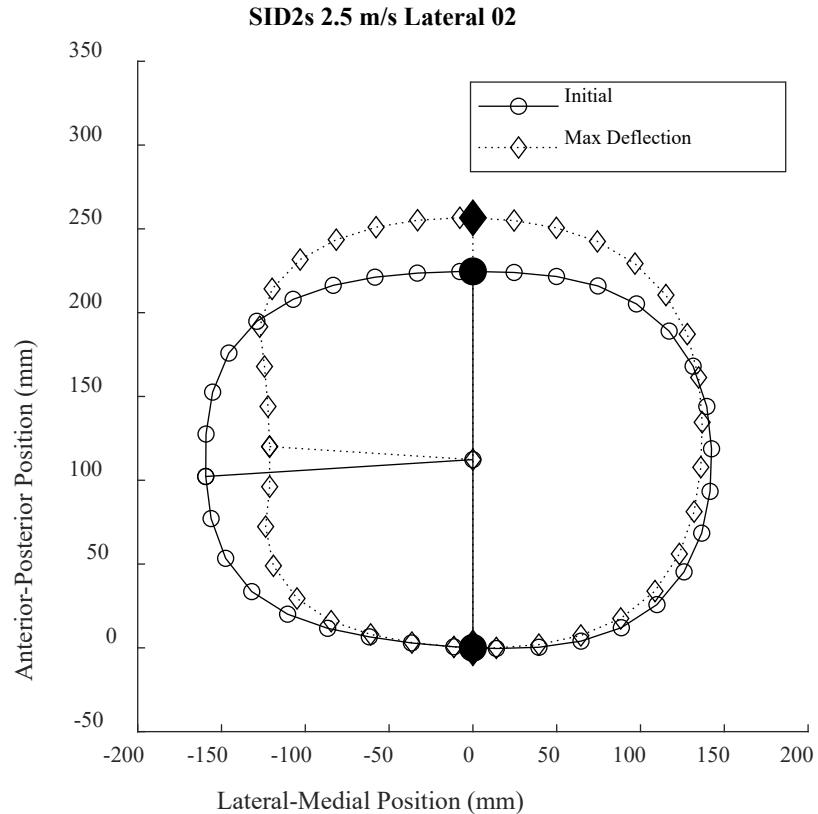
Max Deflection = 42.9 mm



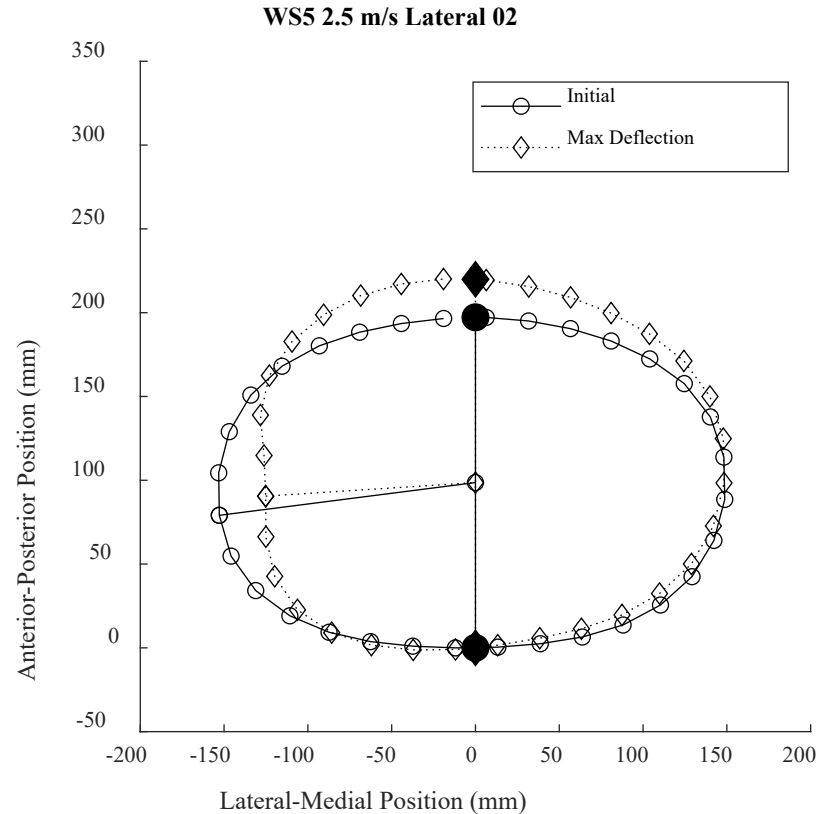
Max Deflection = 29.6 mm

# Shaw (2.5 m/s) lateral impactor test

## Test 2



Max Deflection = 42.9 mm

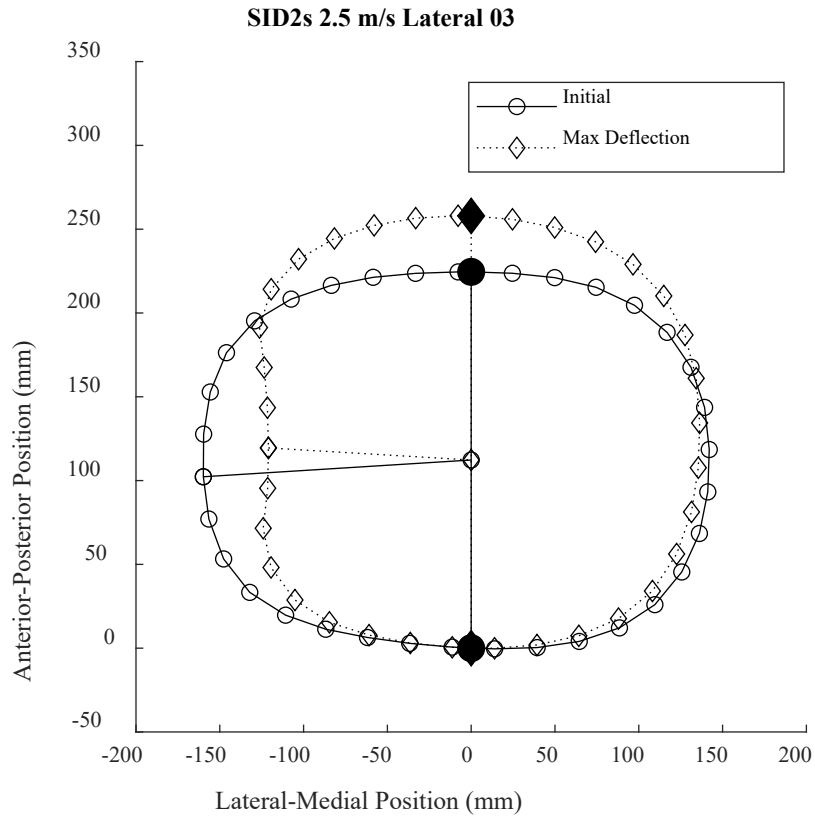


Max Deflection = 28.6 mm

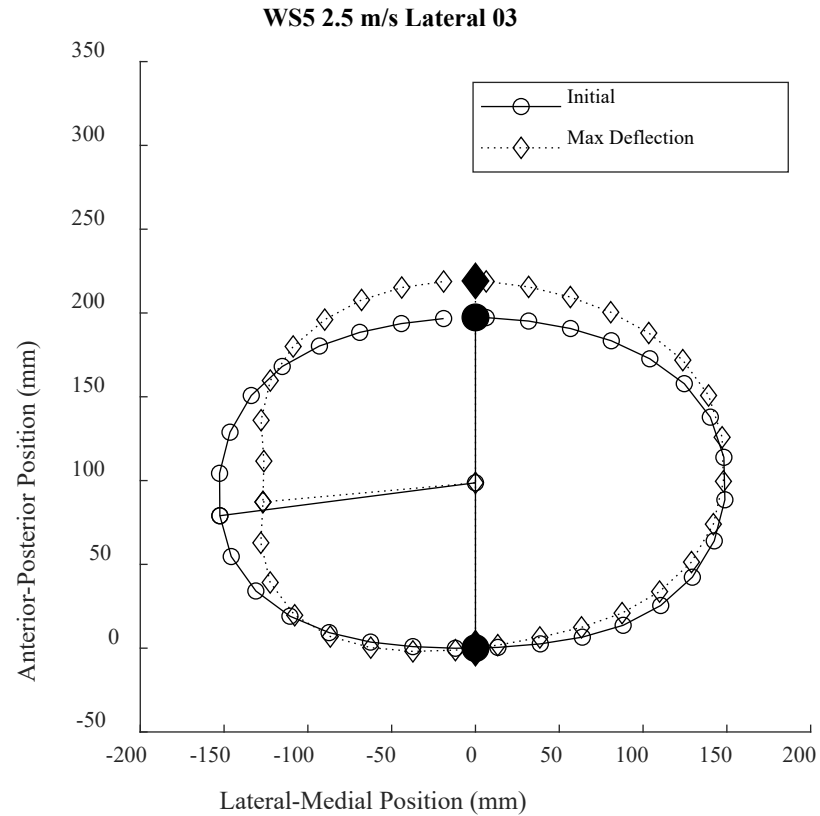


# Shaw (2.5 m/s) lateral impactor test

## Test 3



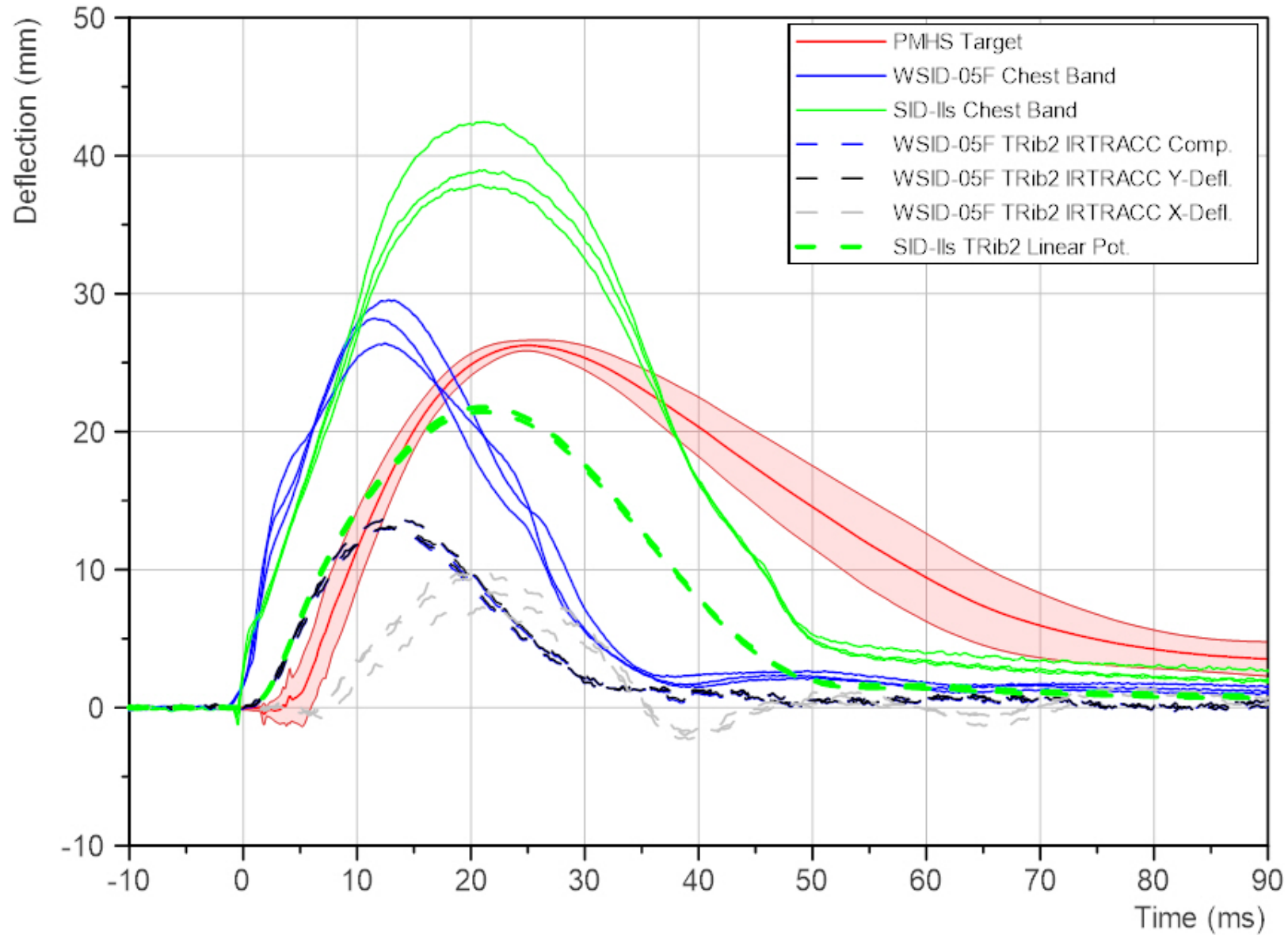
Max Deflection = 38.9 mm



Max Deflection = 26.5 mm

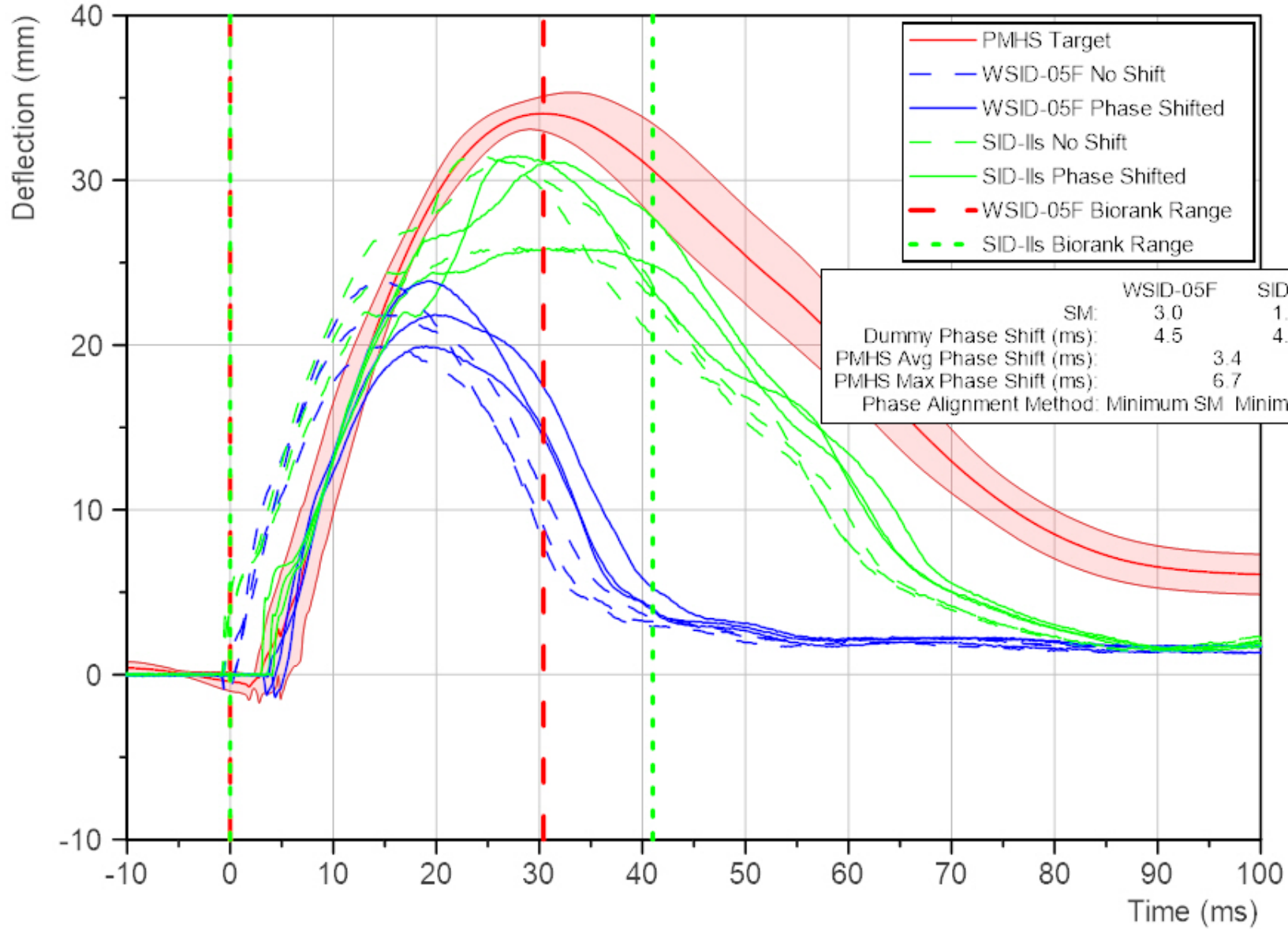
2.5 m/s Shaw Lateral Impact Test  
Chest Band vs IRTRACC/Potentiometer Deflection (CFC1000)

PMHS target is  
from chestband



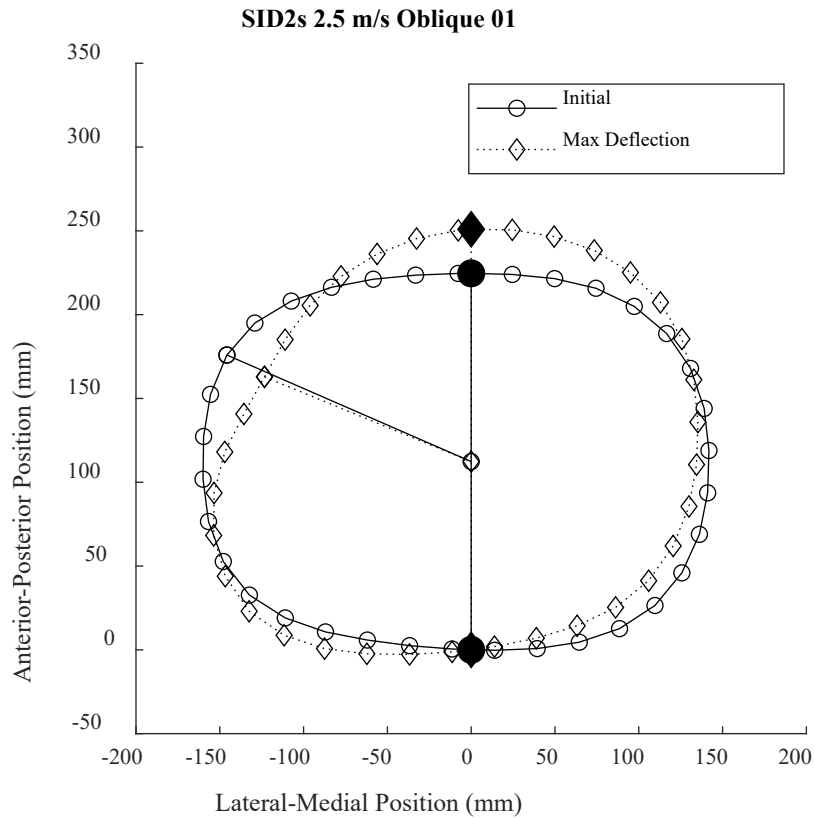
# Shaw Oblique Impact Test

2.5 m/s Shaw Oblique Impact Test  
Chest Band Deflection (CFC1000)

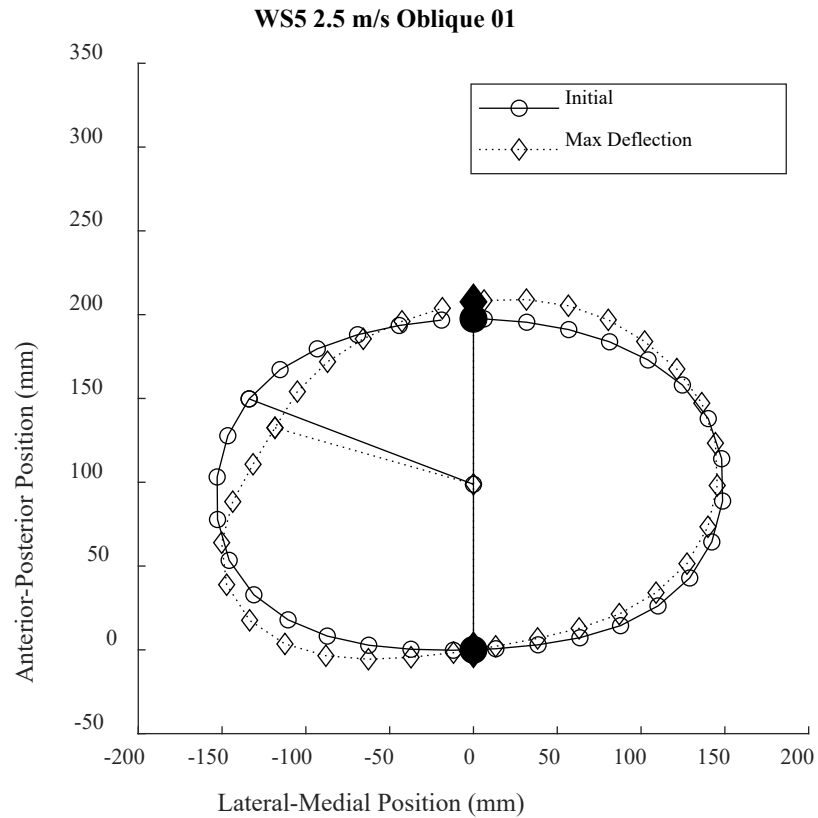


	WS-05F	SID-IIs
Peak only	6.7	2.5

# Shaw (2.5 m/s) oblique impactor test Test 1



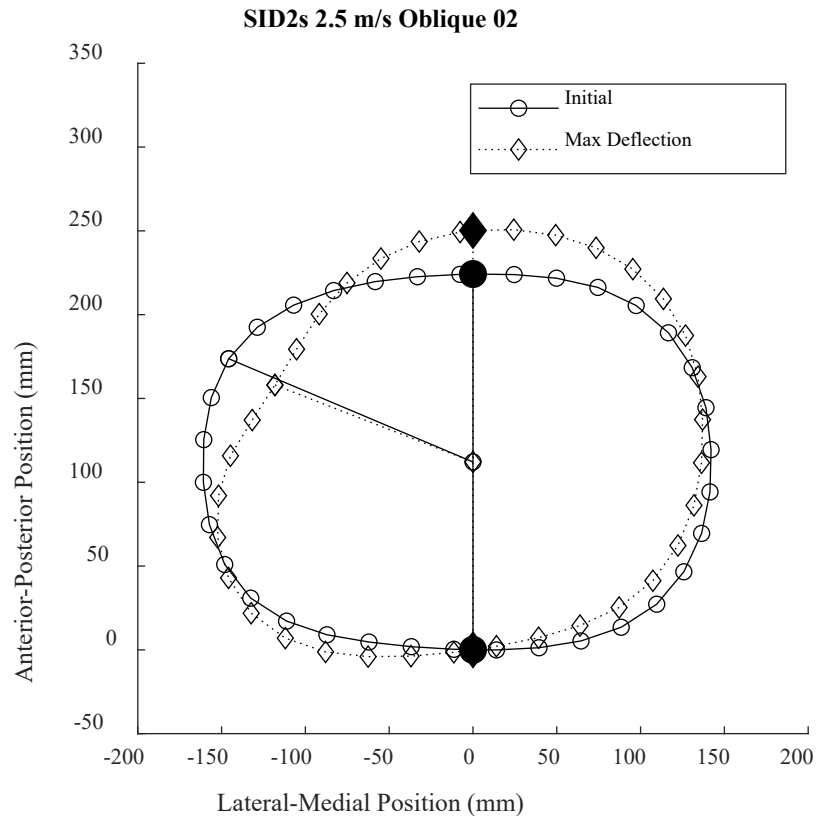
Max Deflection = 25.7 mm



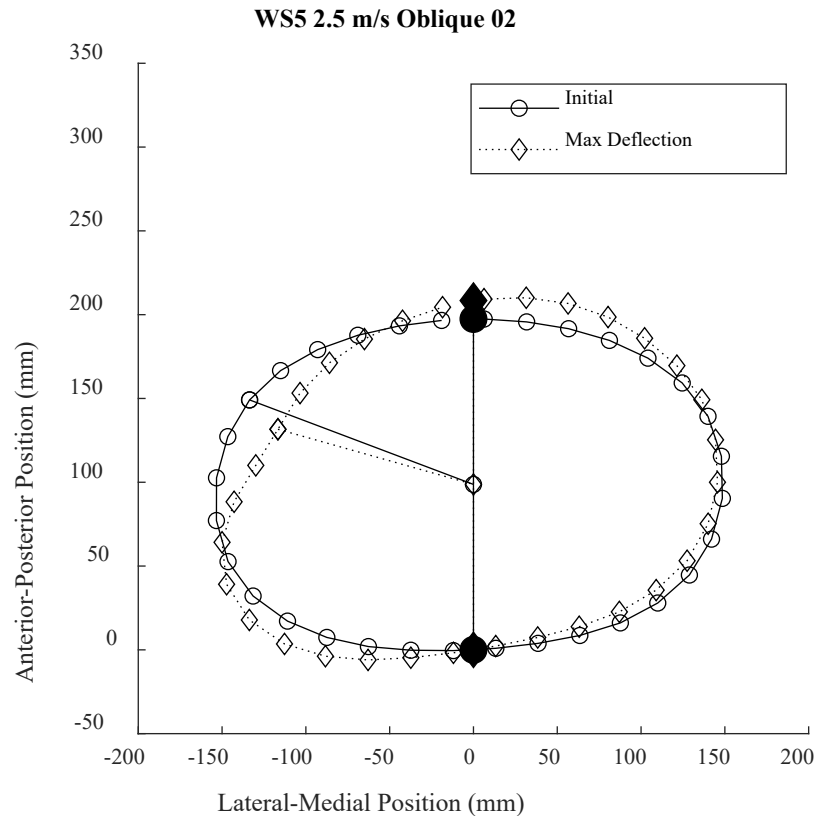
Max Deflection = 20.1 mm

# Shaw (2.5 m/s) oblique impactor test

## Test 2

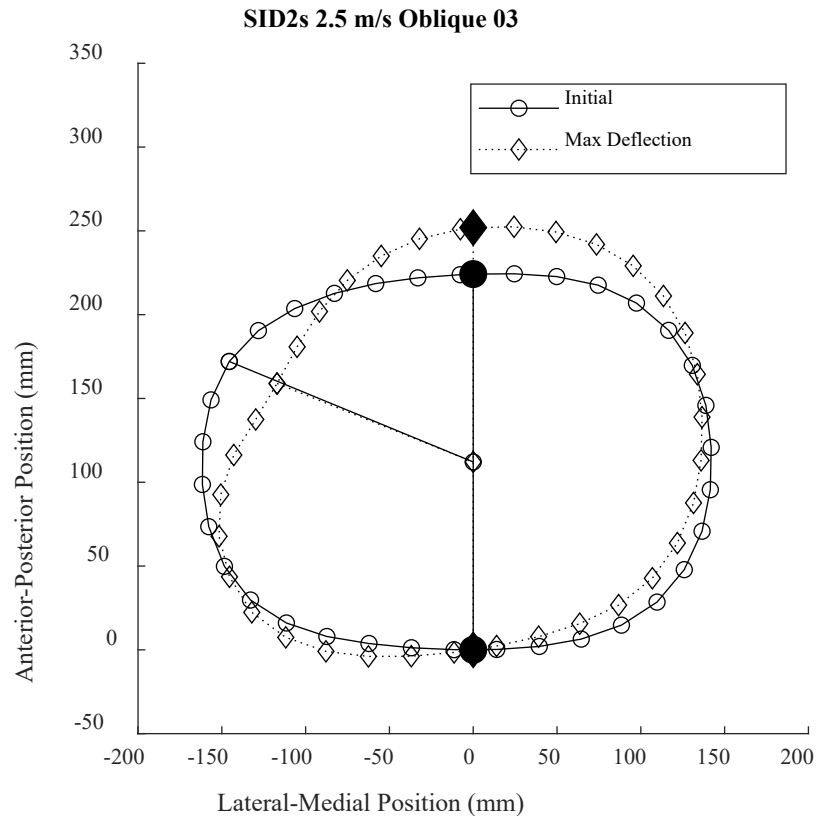


Max Deflection = 31.5 mm

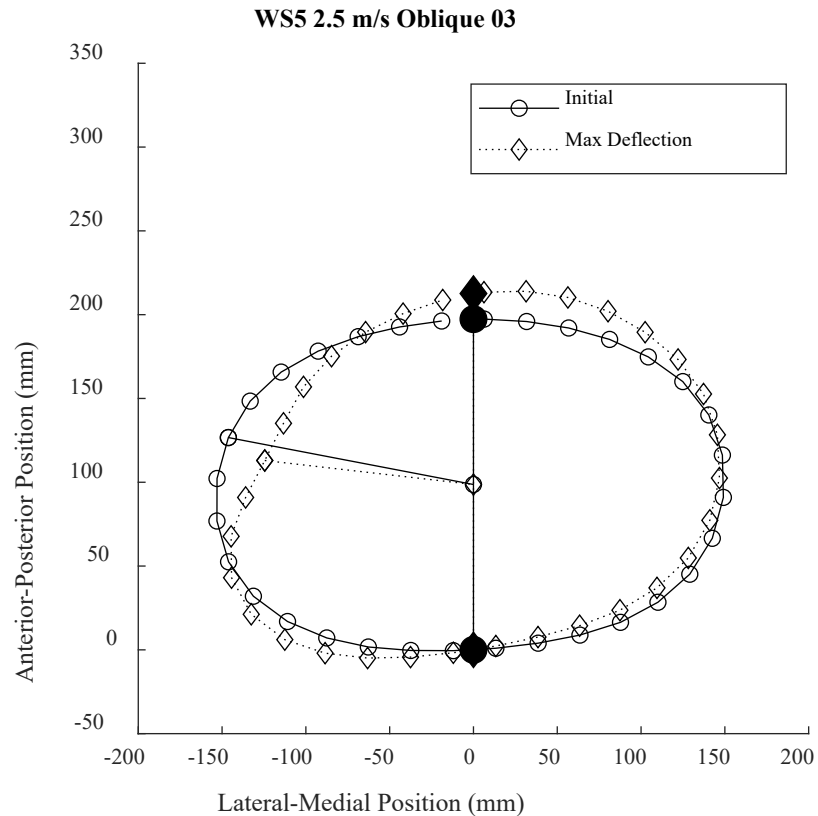


Max Deflection = 21.6 mm

# Shaw (2.5 m/s) oblique impactor test Test 3



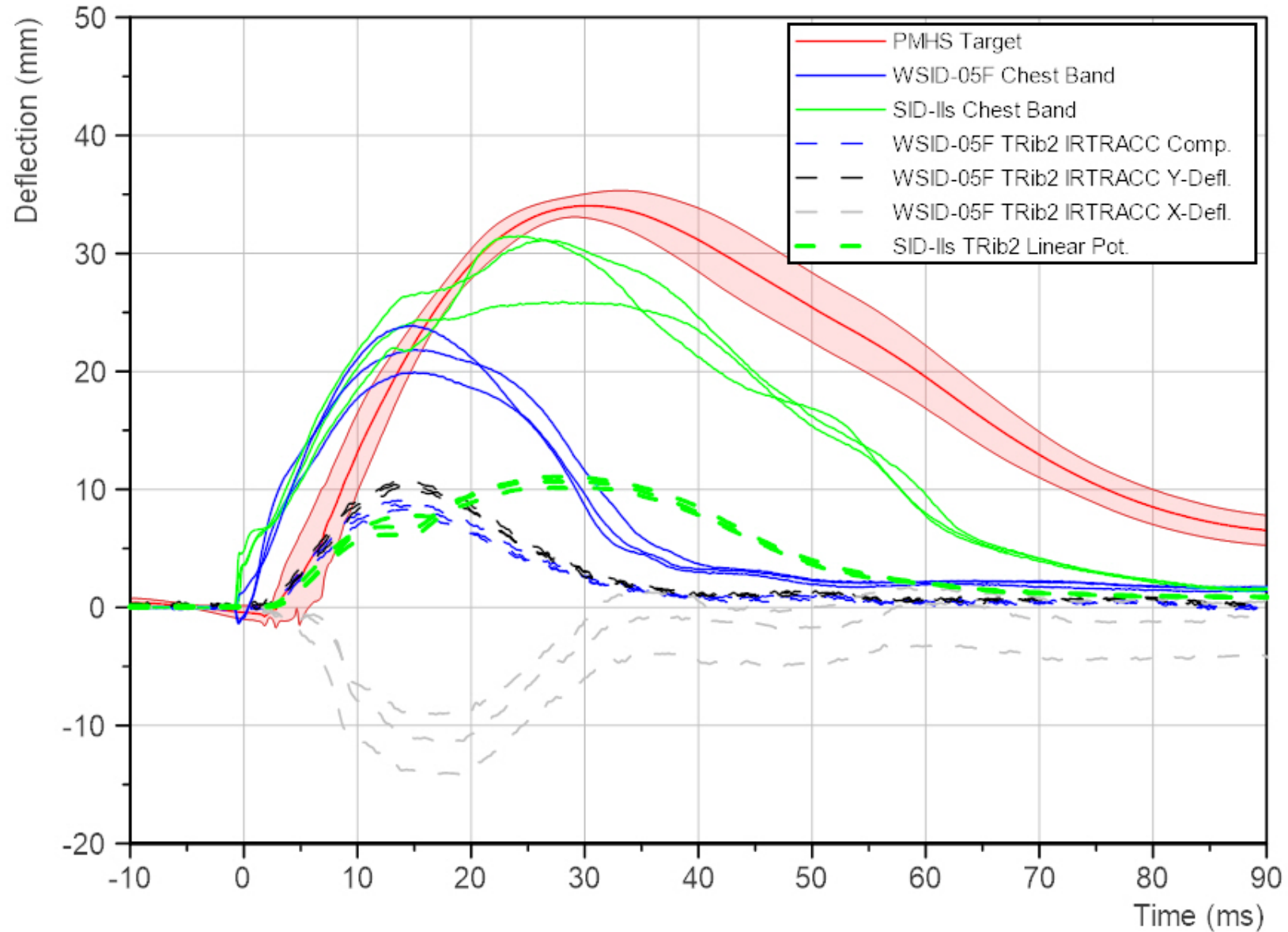
Max Deflection = 31.4 mm



Max Deflection = 23.6 mm

2.5 m/s Shaw Oblique Impact Test  
Chest Band vs IRTRACC/Potentiometer Deflection (CFC1000)

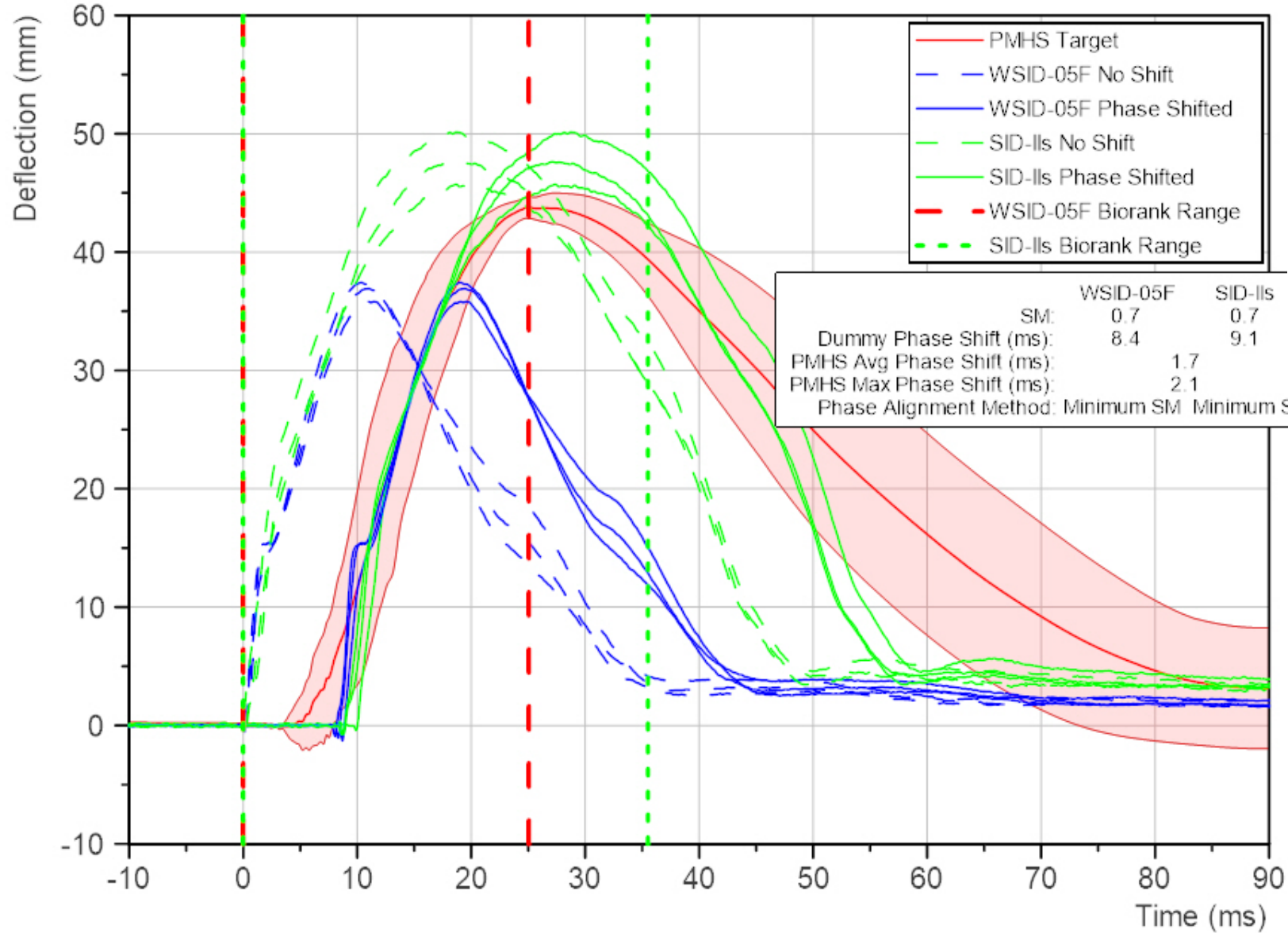
PMHS target is  
from chestband





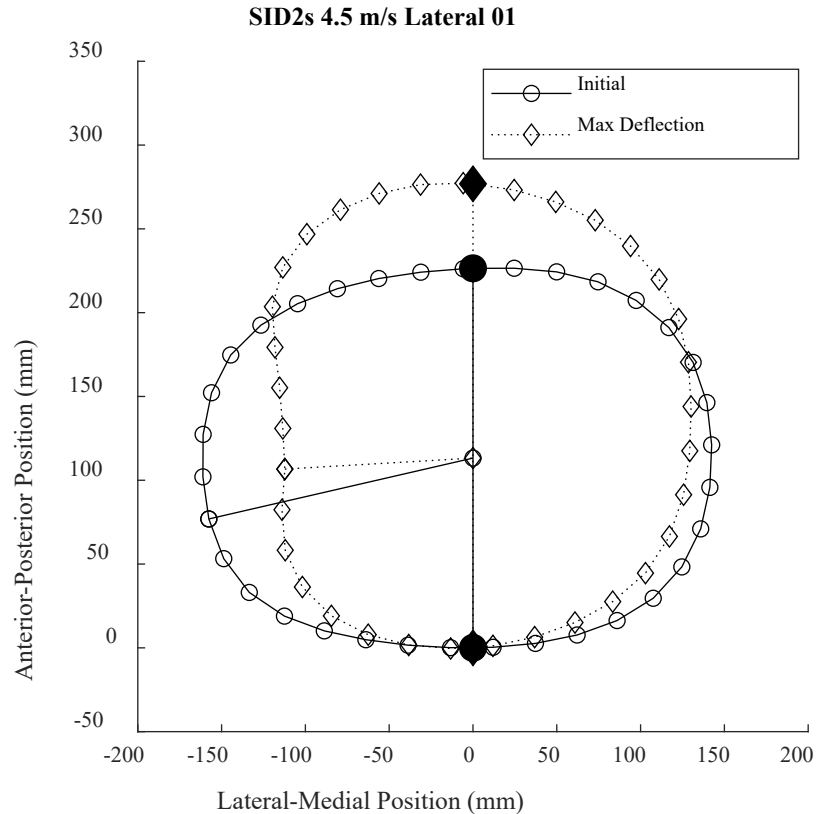
# Rhule Lateral Impact Test

### 4.5 m/s Rhule Lateral Impact Test Chest Band Deflection (CFC1000)

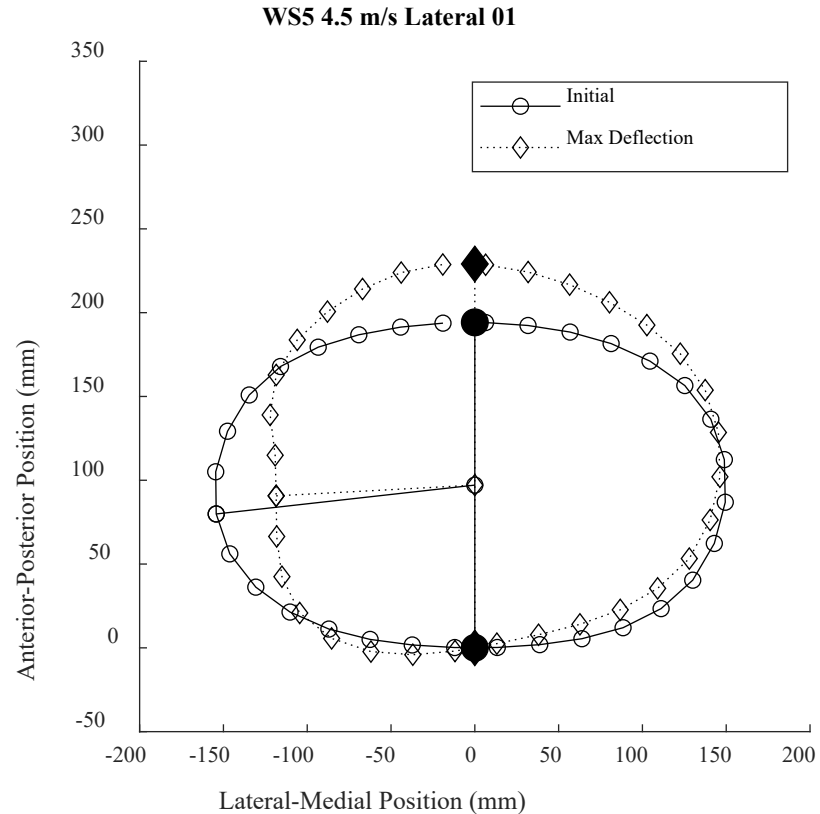


	WSID-05F	SID-IIs
Peak only	2.8	1.6

# Rhule (4.5 m/s) lateral impactor test Test 1

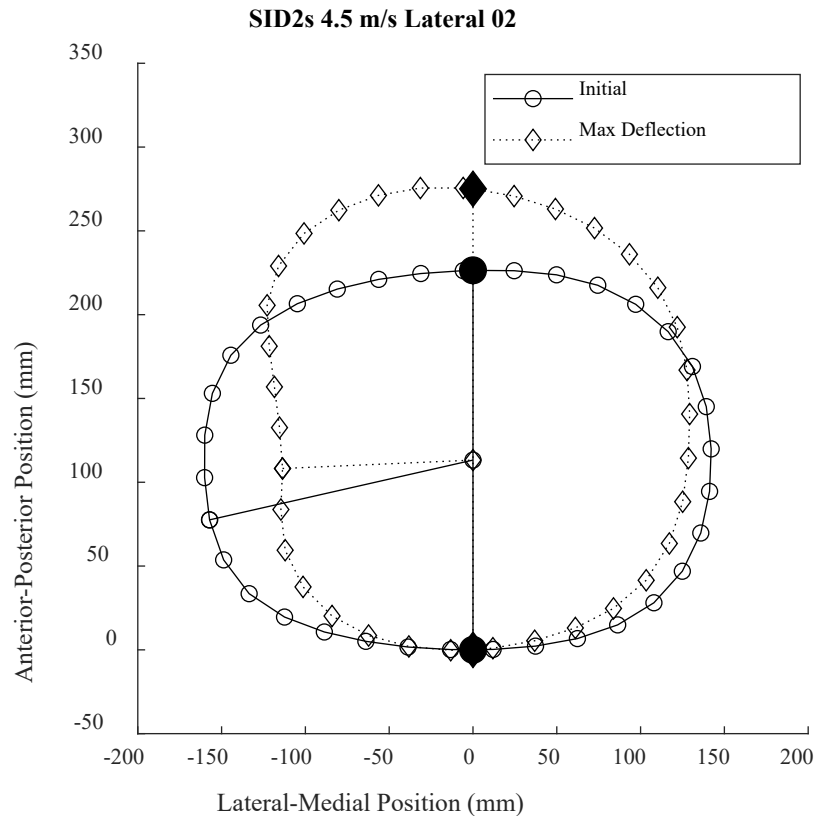


Max Deflection = 49.3 mm

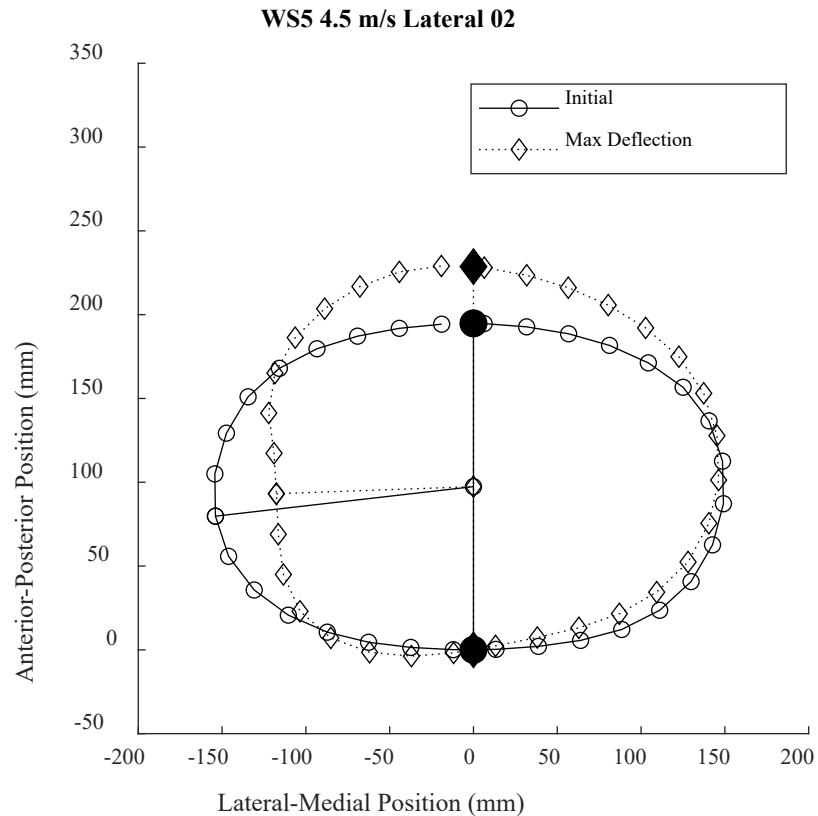


Max Deflection = 36.6 mm

# Rhule (4.5 m/s) lateral impactor test Test 2

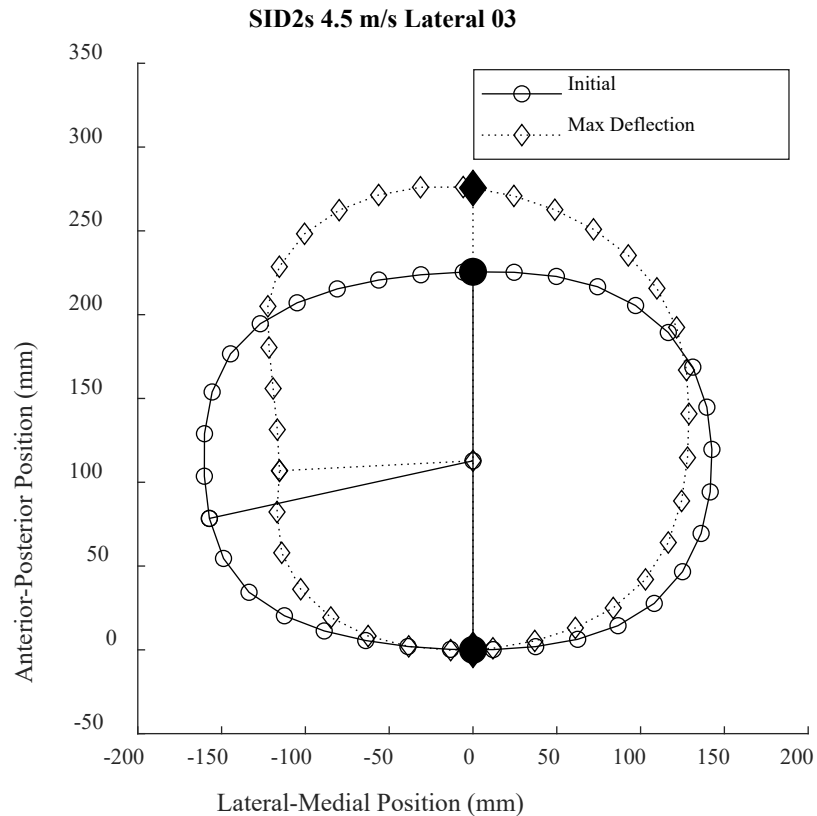


Max Deflection = 47.4 mm

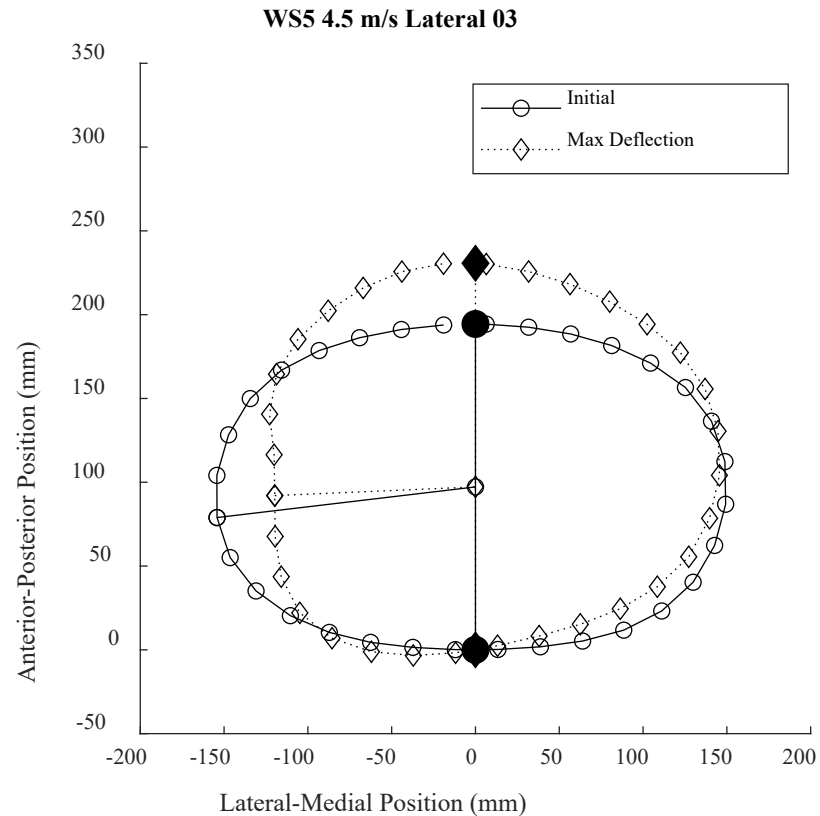


Max Deflection = 37.3 mm

# Rhule (4.5 m/s) lateral impactor test Test 3



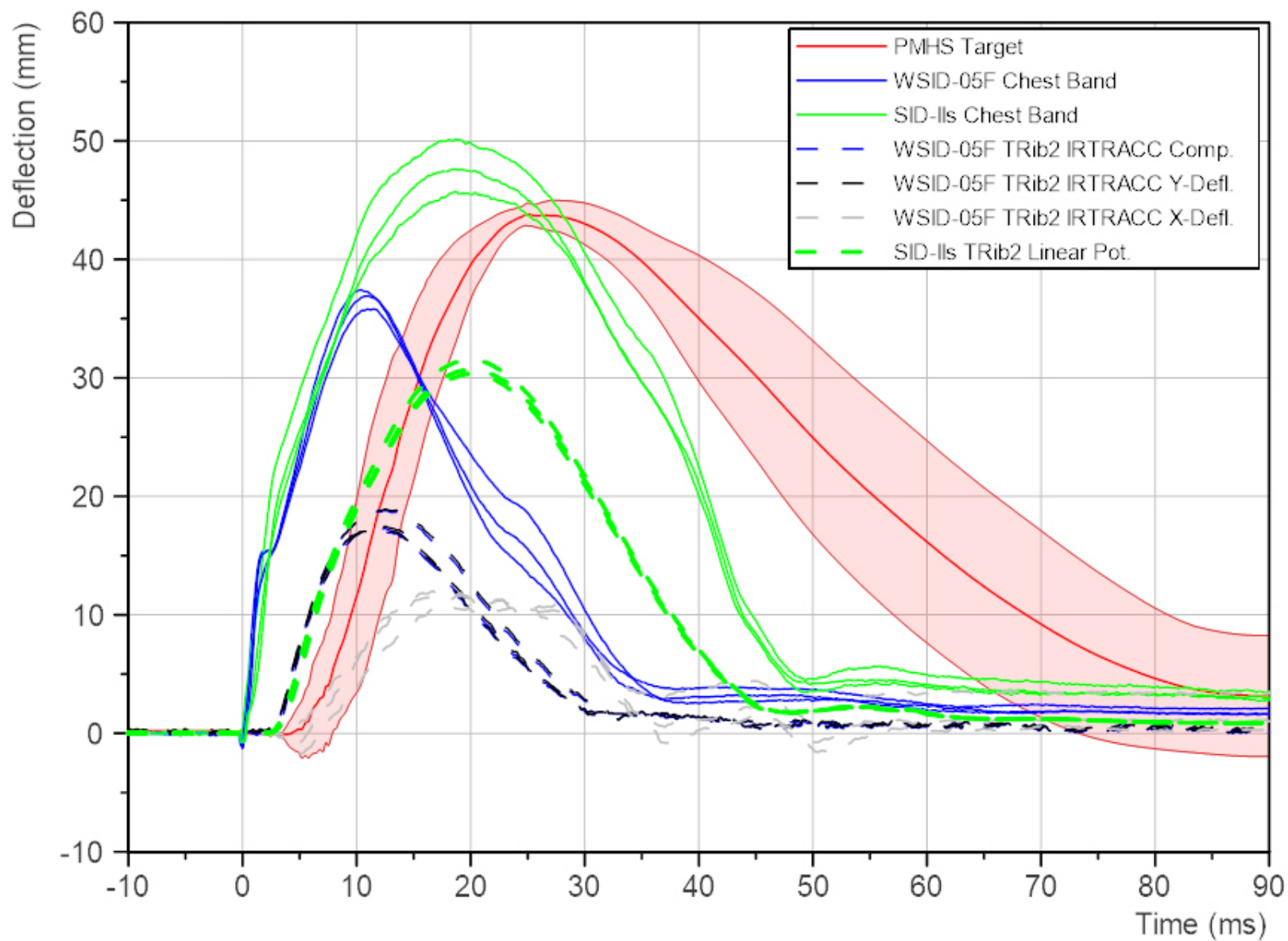
Max Deflection = 45.4 mm



Max Deflection = 35.4 mm

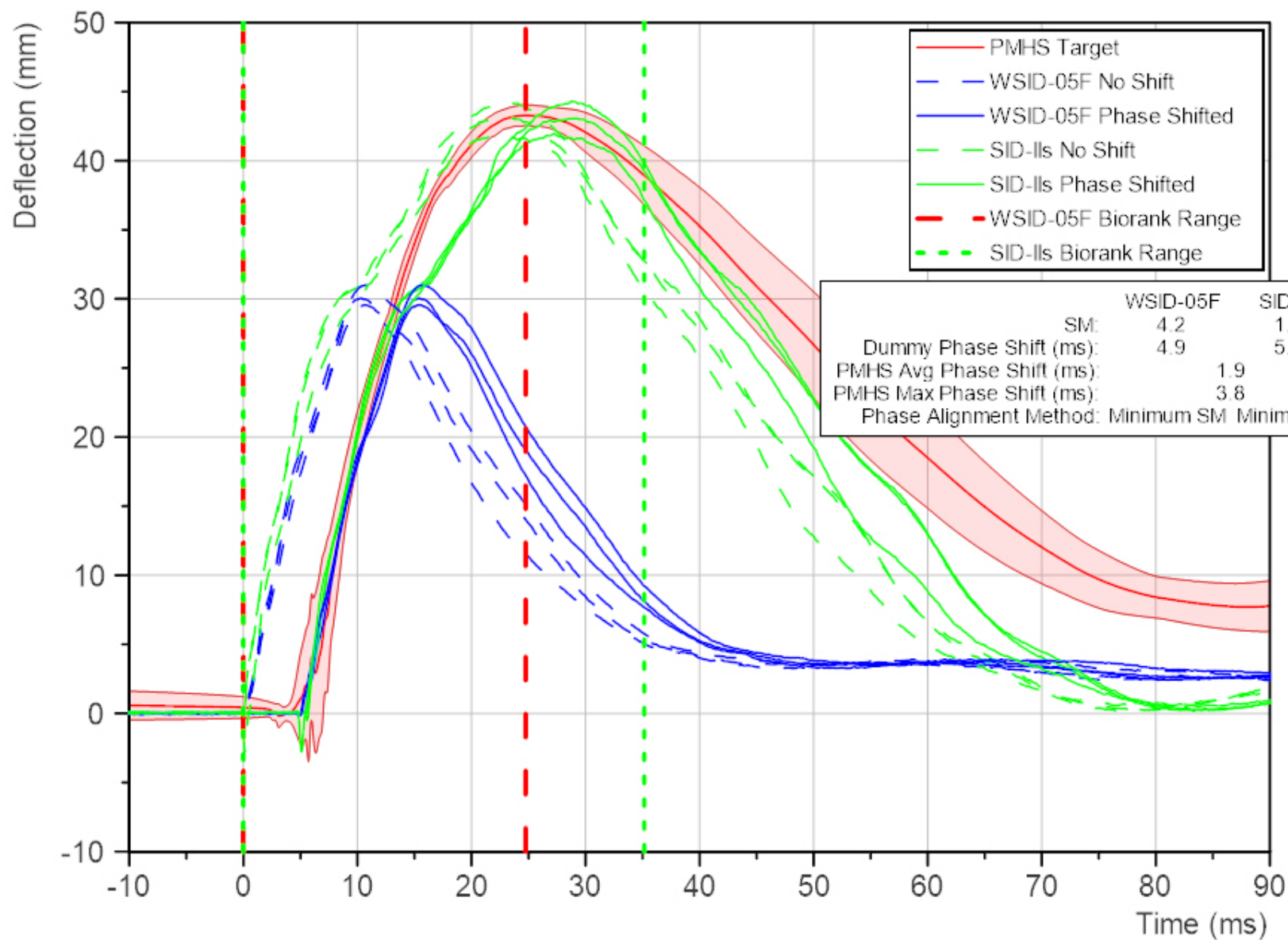
4.5 m/s Rhule Lateral Impact Test  
Chest Band vs IRTRACC/Potentiometer Deflection (CFC1000)

PMHS target is  
from chestband



Rhule Oblique Impact Test

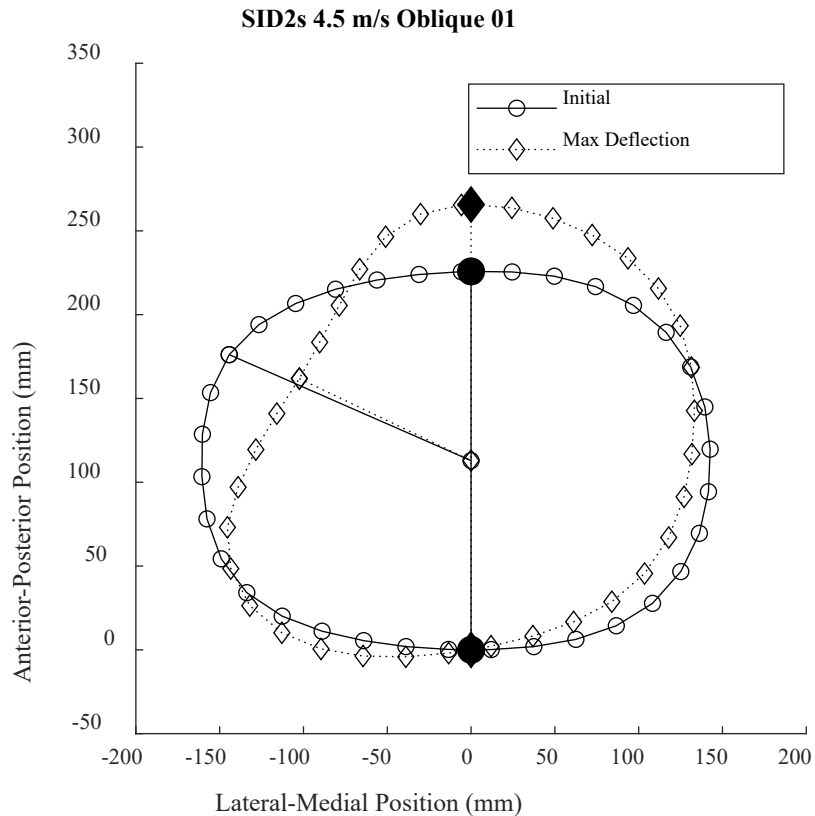
4.5 m/s Rhule Oblique Impact Test  
Chest Band Deflection (CFC1000)



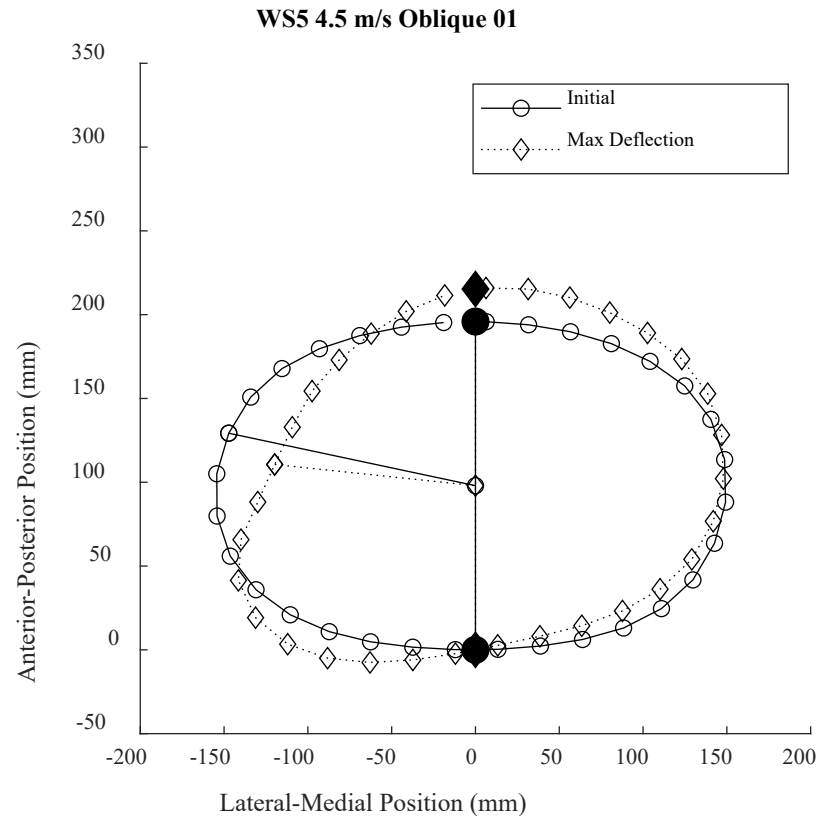
Peak only WS-05F 9.3 SID-IIs 0.6



# Rhule (4.5 m/s) oblique impactor test Test 1

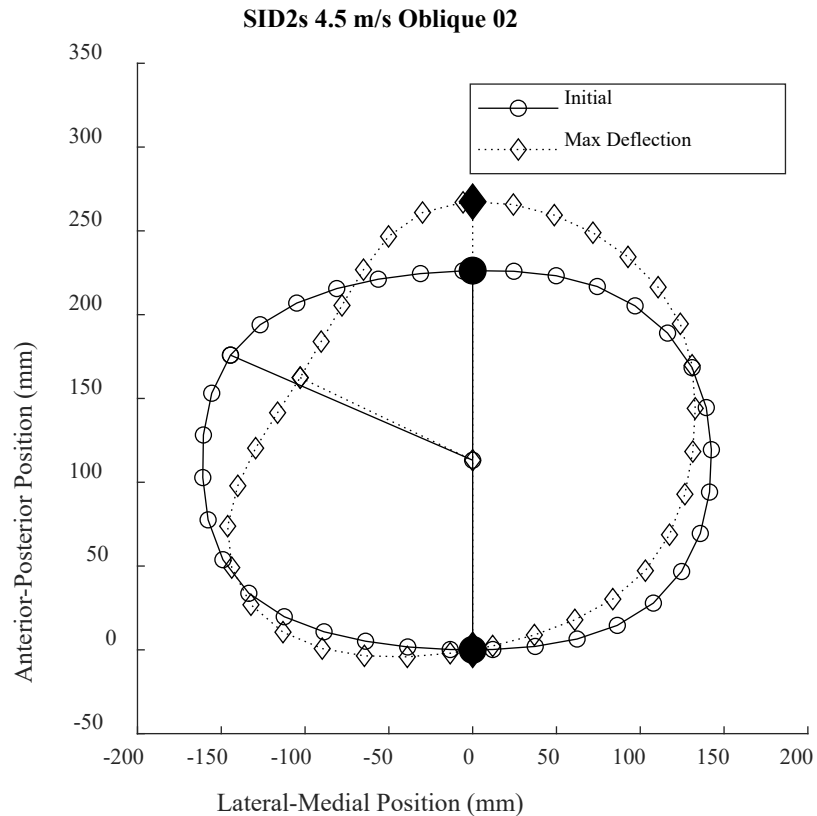


Max Deflection = 44.0 mm

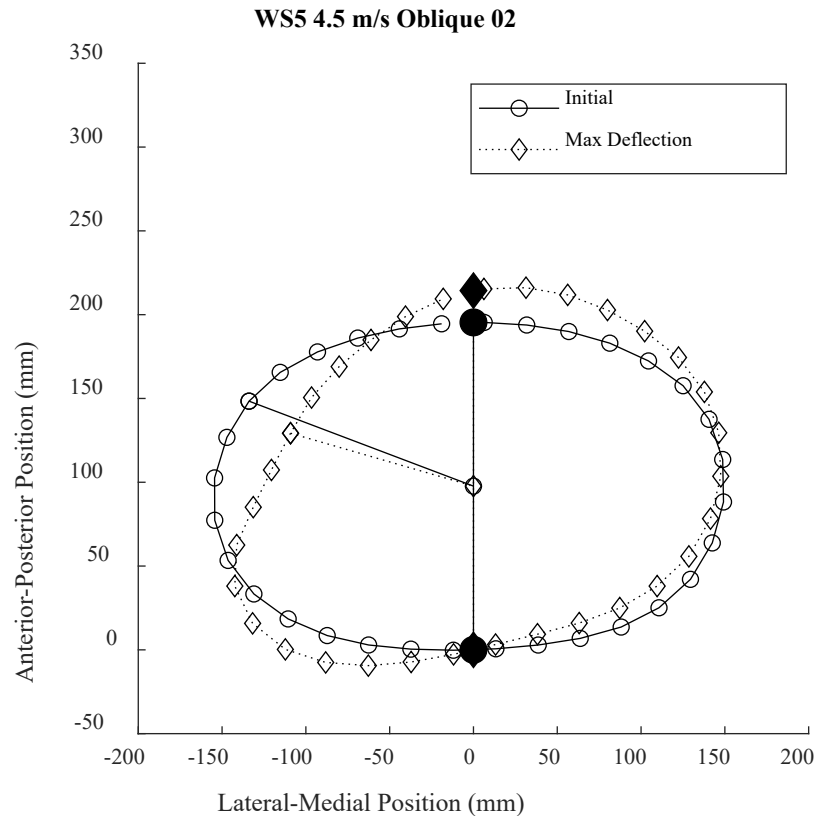


Max Deflection = 30.0 mm

# Rhule (4.5 m/s) oblique impactor test Test 2

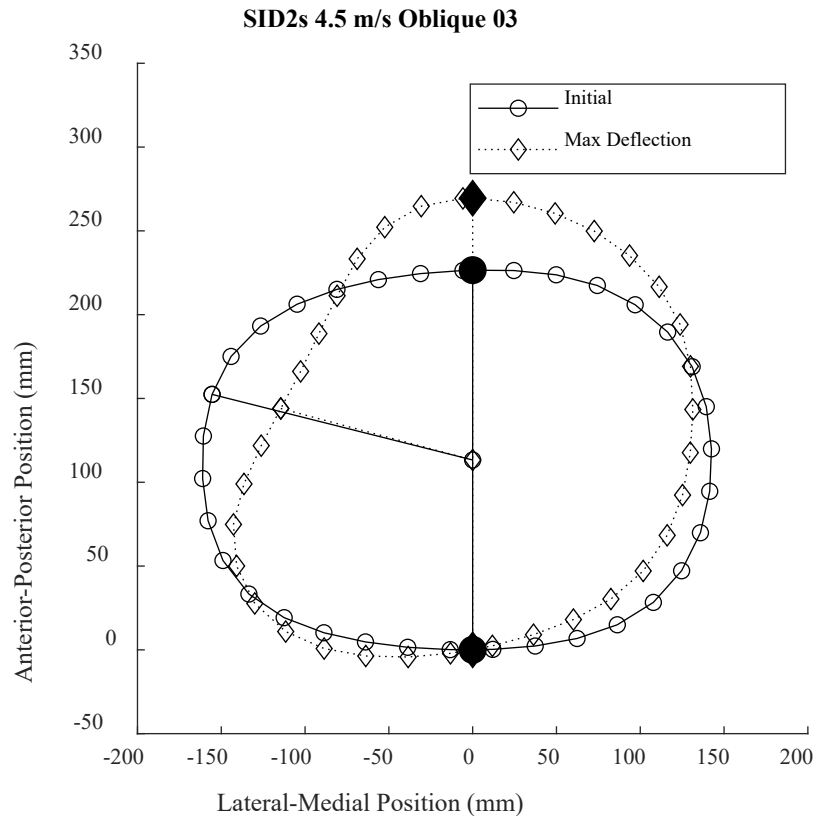


Max Deflection = 43.4 mm

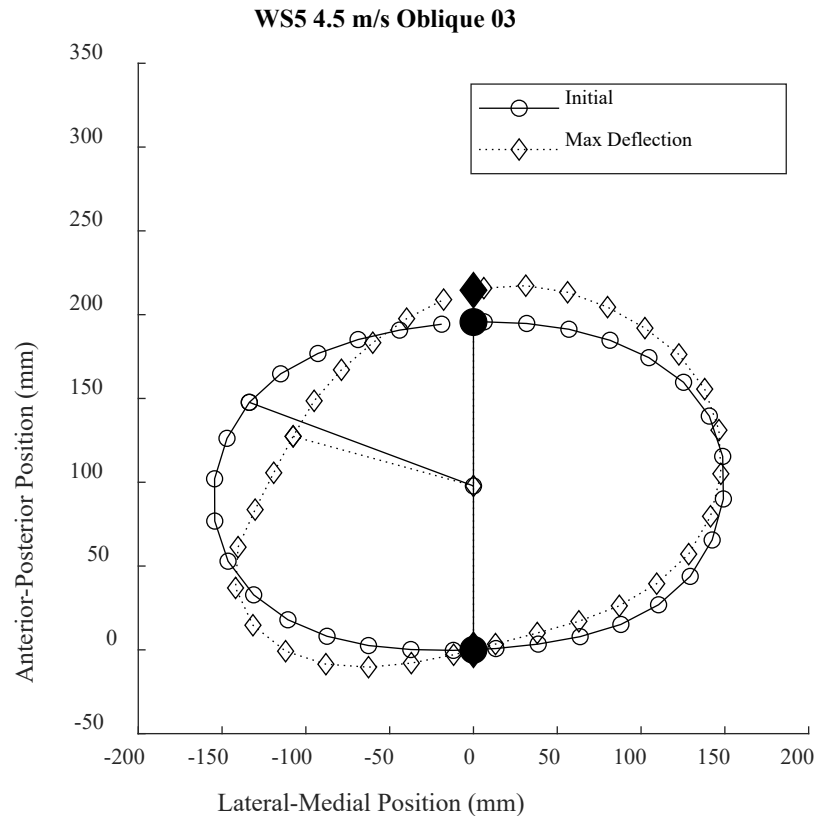


Max Deflection = 29.6 mm

# Rhule (4.5 m/s) oblique impactor test Test 3



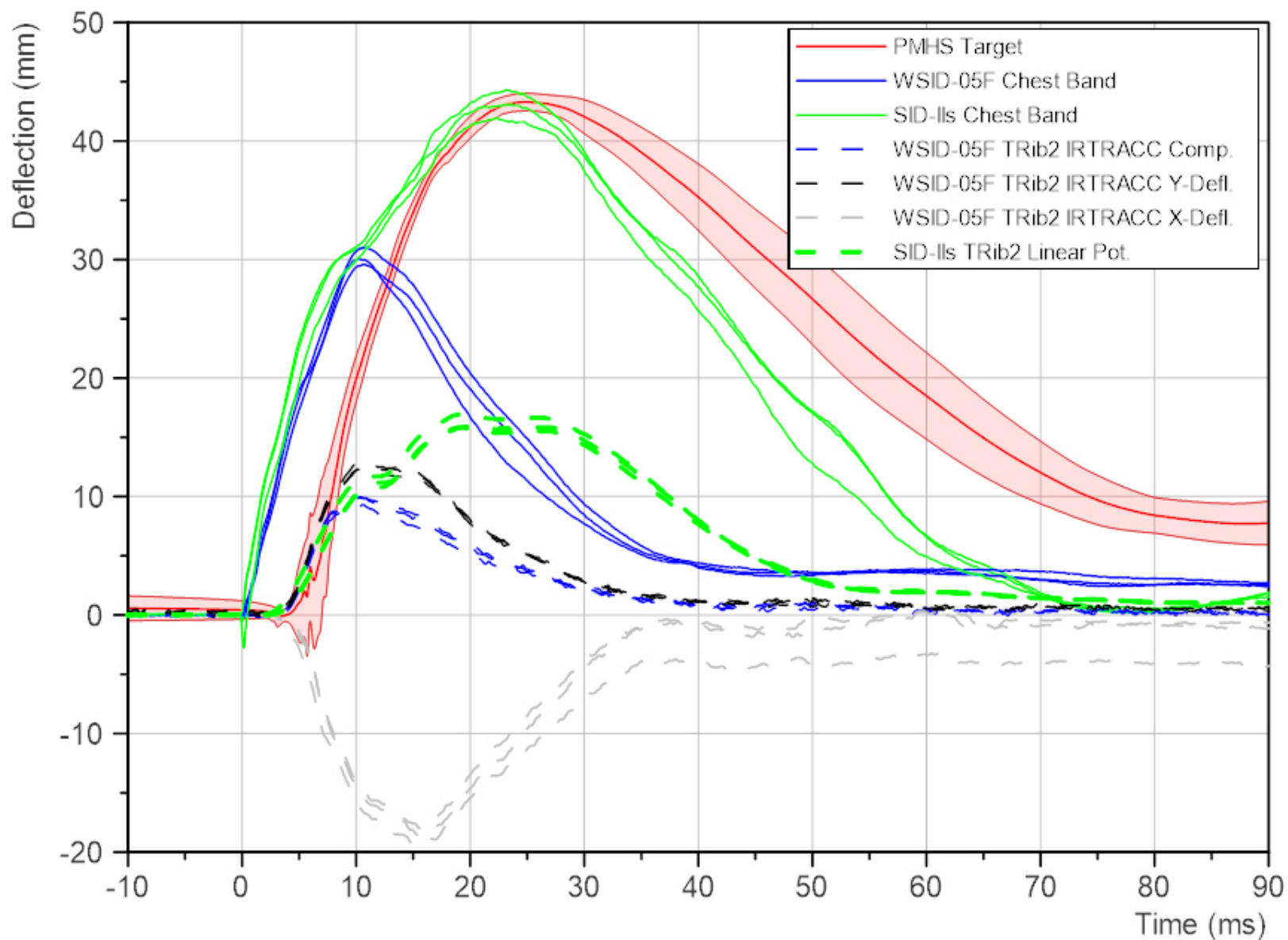
Max Deflection = 41.8 mm



Max Deflection = 31.1 mm

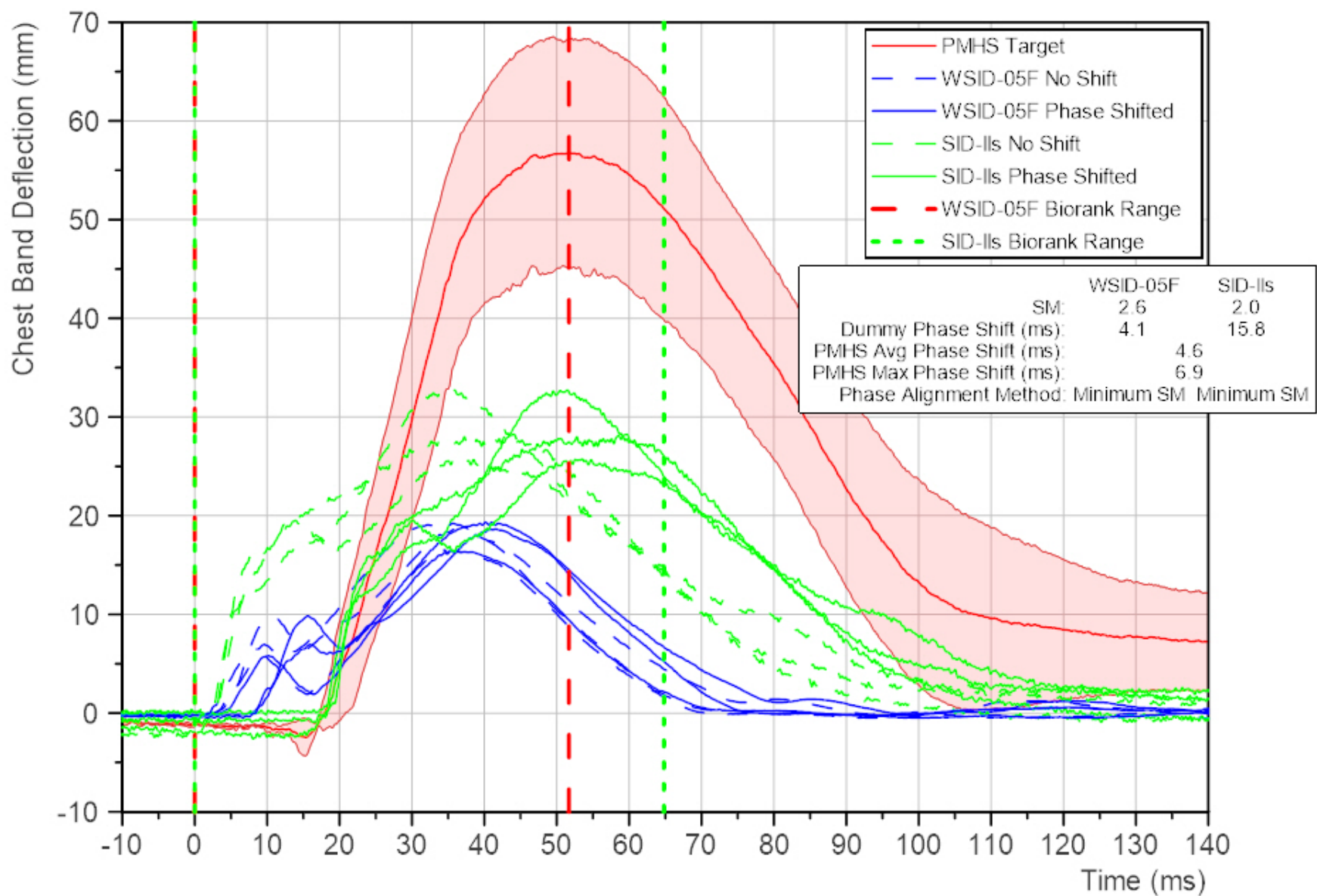
4.5 m/s Rhule Oblique Impact Test  
Chest Band vs IRTRACC/Potentiometer Deflection (CFC1000)

PMHS target is  
from chestband

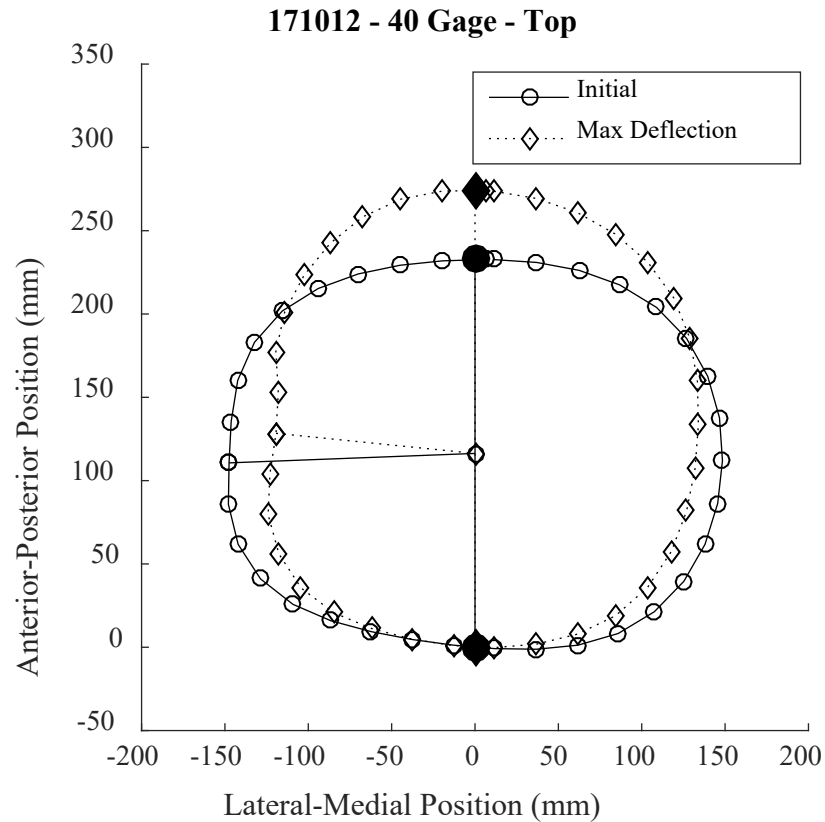


6.7 m/s Padded Flat Wall Sled  
Test

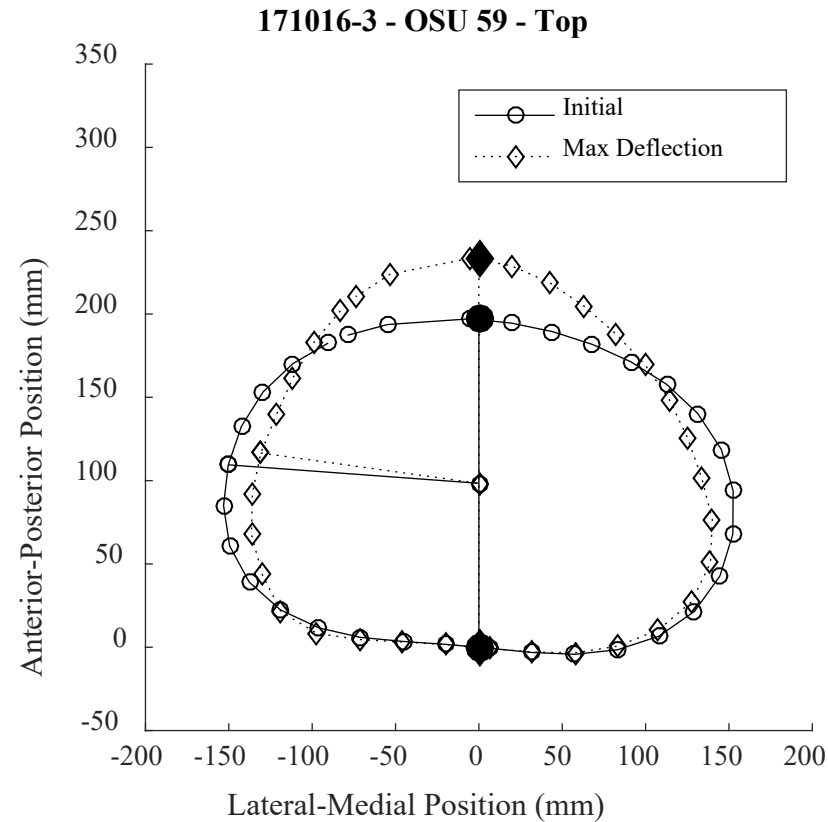
Padded Low-Speed (6.7 m/s) Flat Wall Sled Test  
Upper Thorax Deflection (CFC1000)



# 6.7 m/s Padded Flat Wall (MCW) Top Band, Test 1

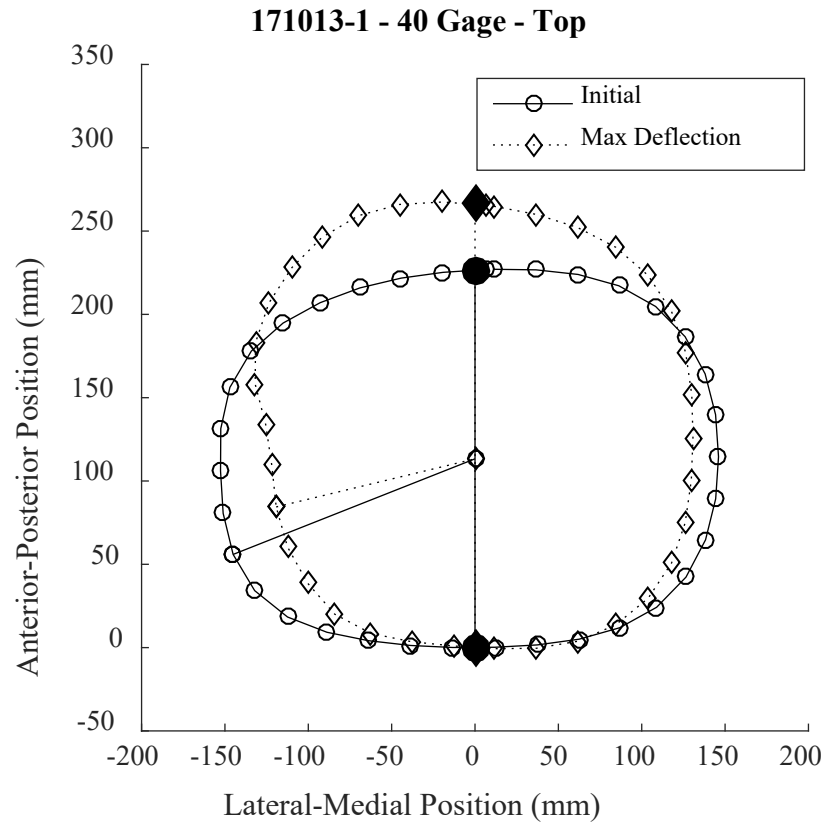


SID-IIs MCW PLF-1  
Max Deflection = 27.7 mm

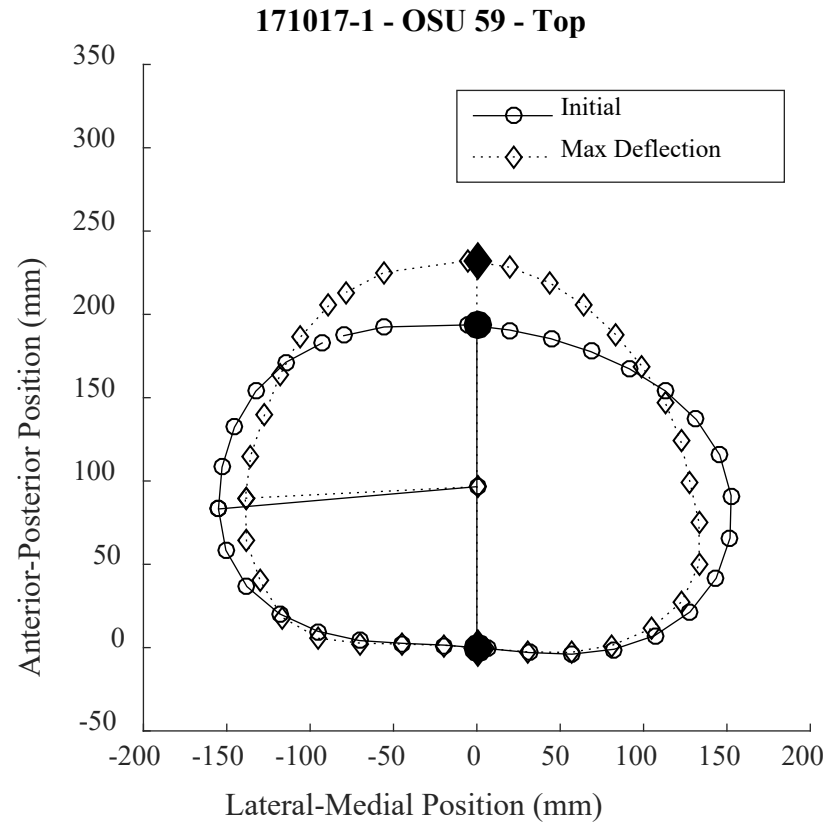


WS 5<sup>th</sup> MCW PLF-1  
Max Deflection = 18.7 mm

# 6.7 m/s Padded Flat Wall (MCW) Top Band, Test 2



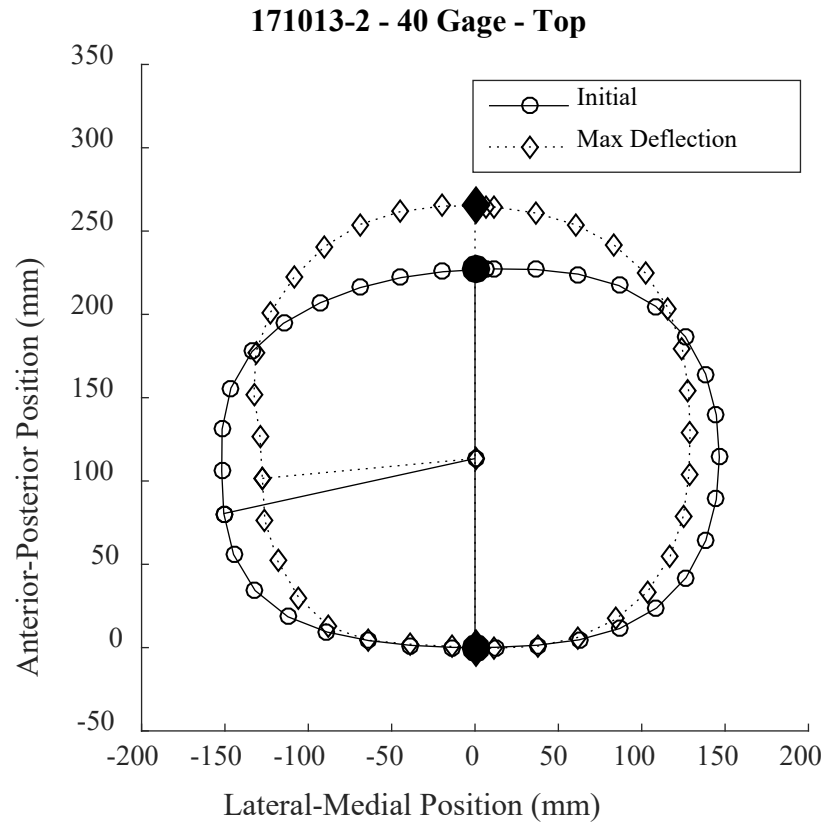
SID-IIs MCW PLF-2  
Max Deflection = 33.3 mm



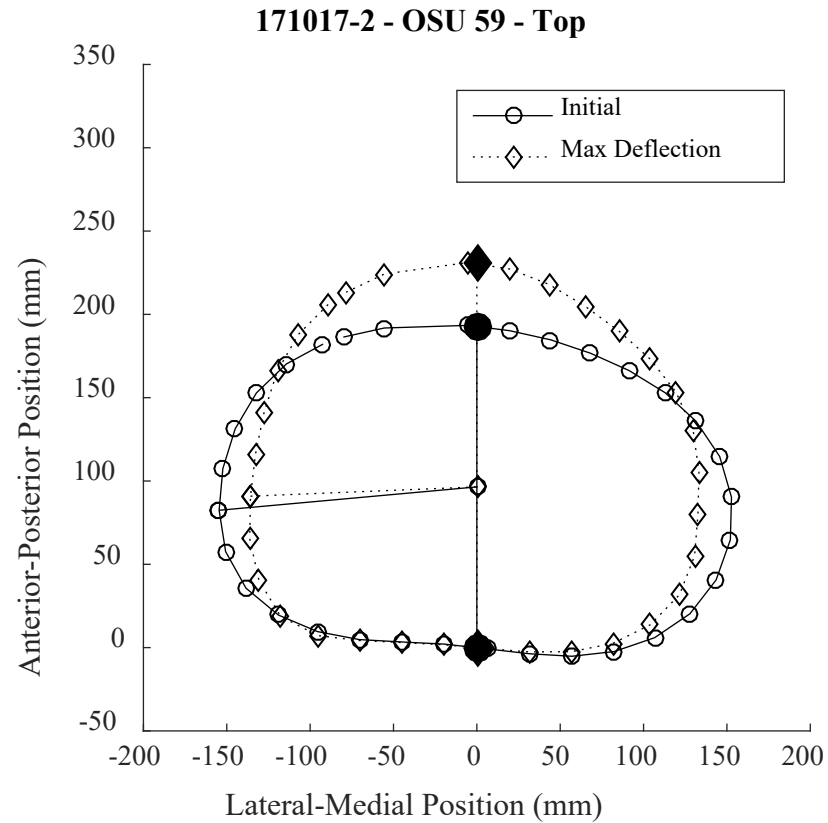
WS 5<sup>th</sup> MCW PLF-2  
Max Deflection = 16.5 mm



# 6.7 m/s Padded Flat Wall (MCW) Top Band, Test 3

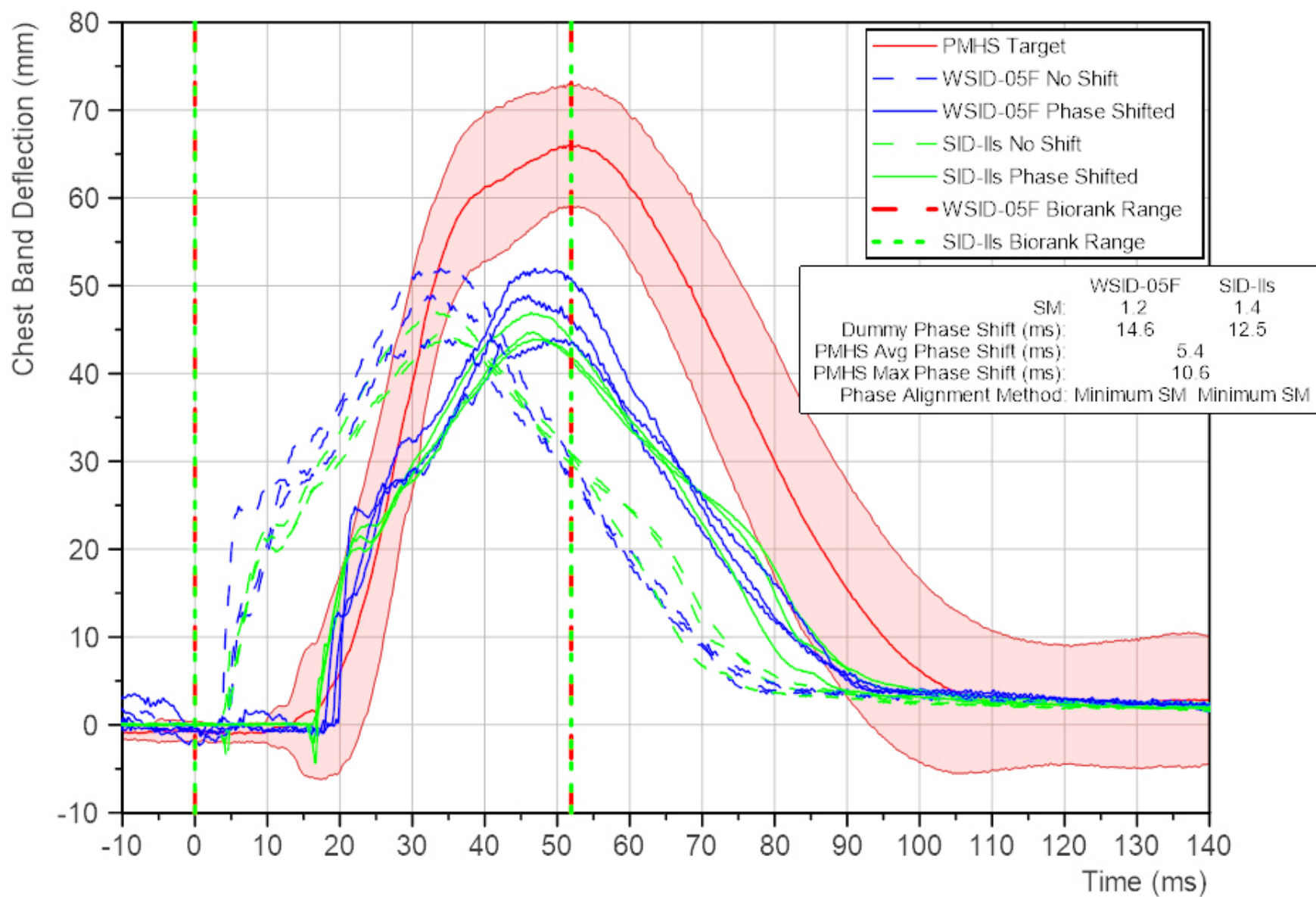


SID-IIs MCW PLF-3  
Max Deflection = 26.2 mm

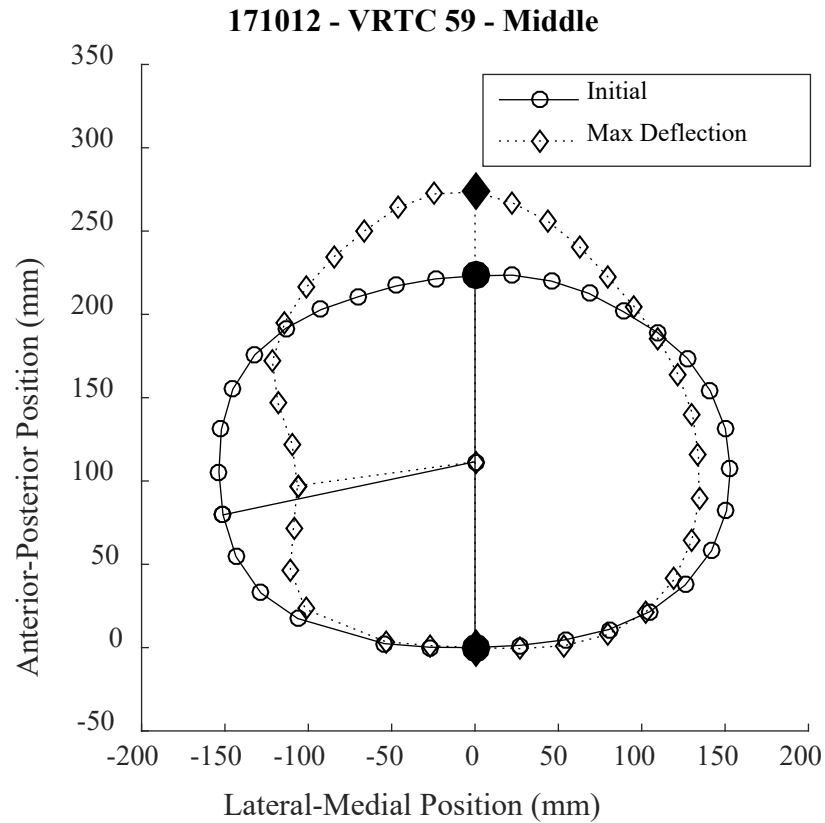


WS 5<sup>th</sup> MCW PLF-3  
Max Deflection = 19.3 mm

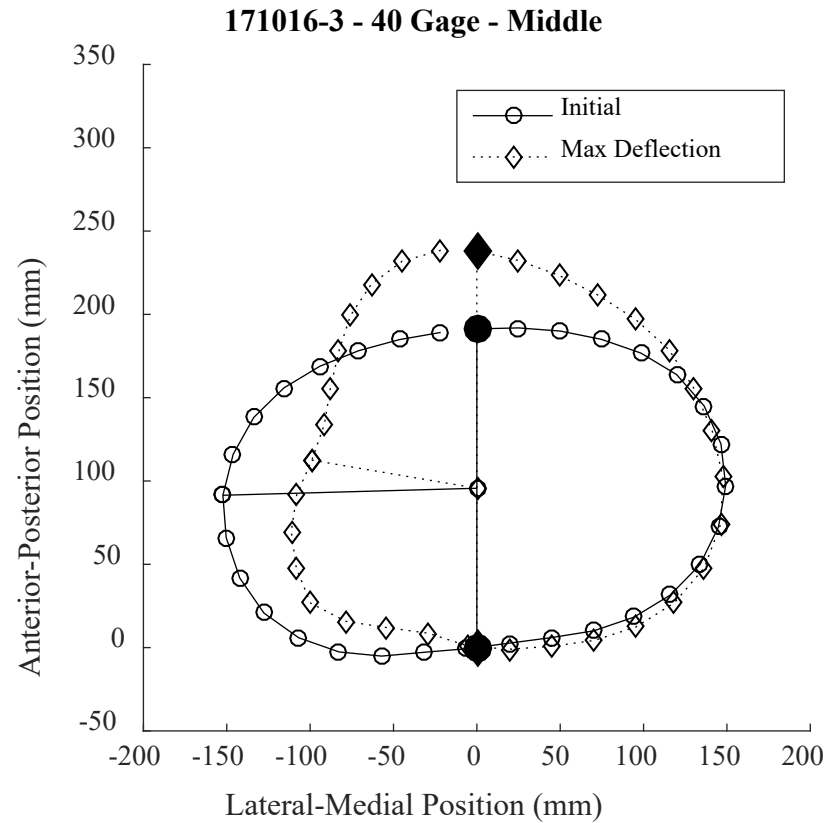
Padded Low-Speed (6.7 m/s) Flat Wall Sled Test  
 Lower Thorax Deflection (CFC1000)



# 6.7 m/s Padded Flat Wall (MCW) Middle Band, Test 1

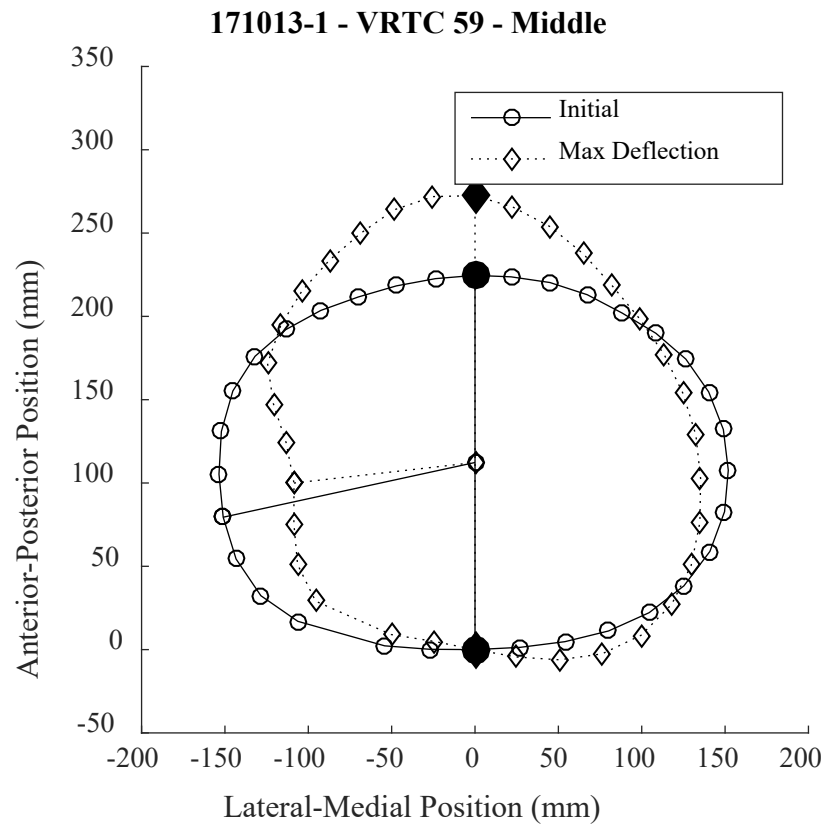


SID-IIs MCW PLF-1  
Max Deflection = 47.0 mm

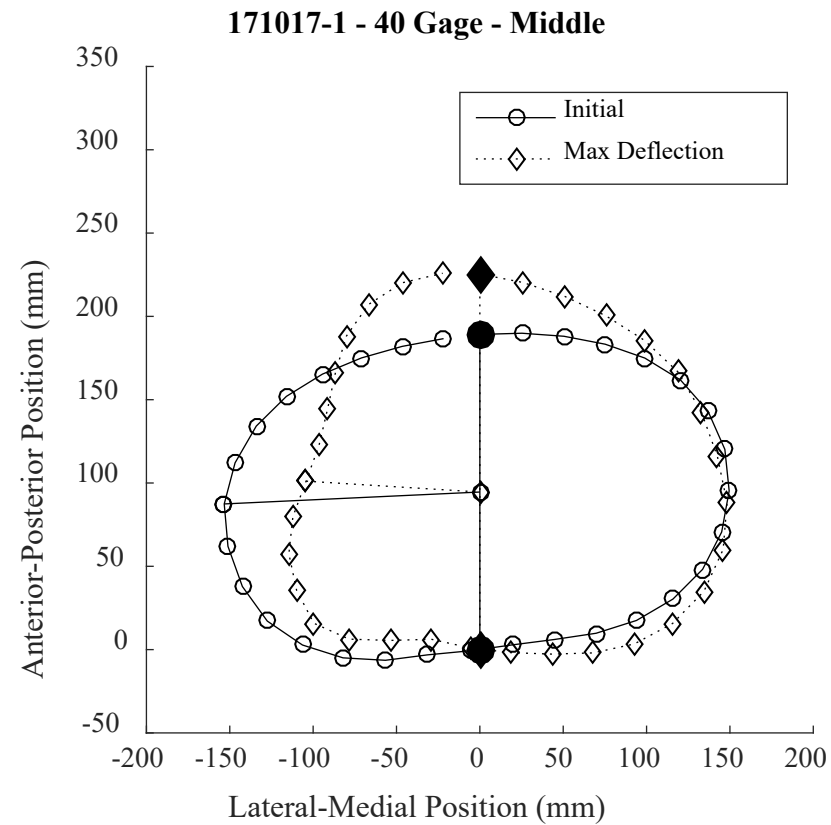


WS 5<sup>th</sup> MCW PLF-1  
Max Deflection = 52.0 mm

# 6.7 m/s Padded Flat Wall (MCW) Middle Band, Test 2

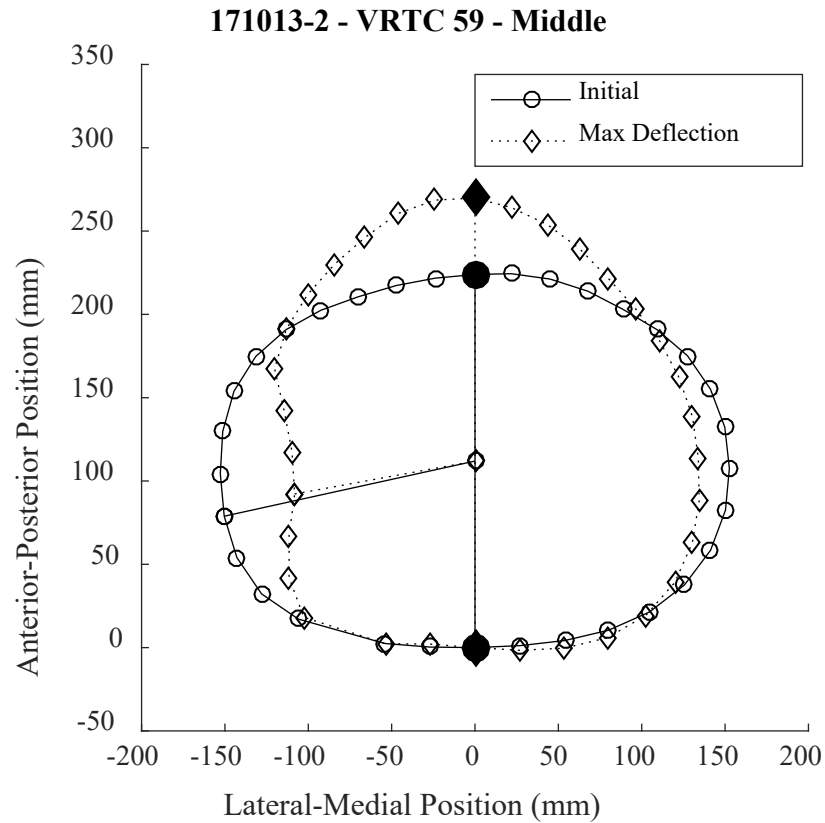


SID-IIs MCW PLF-2  
Max Deflection = 45.3 mm

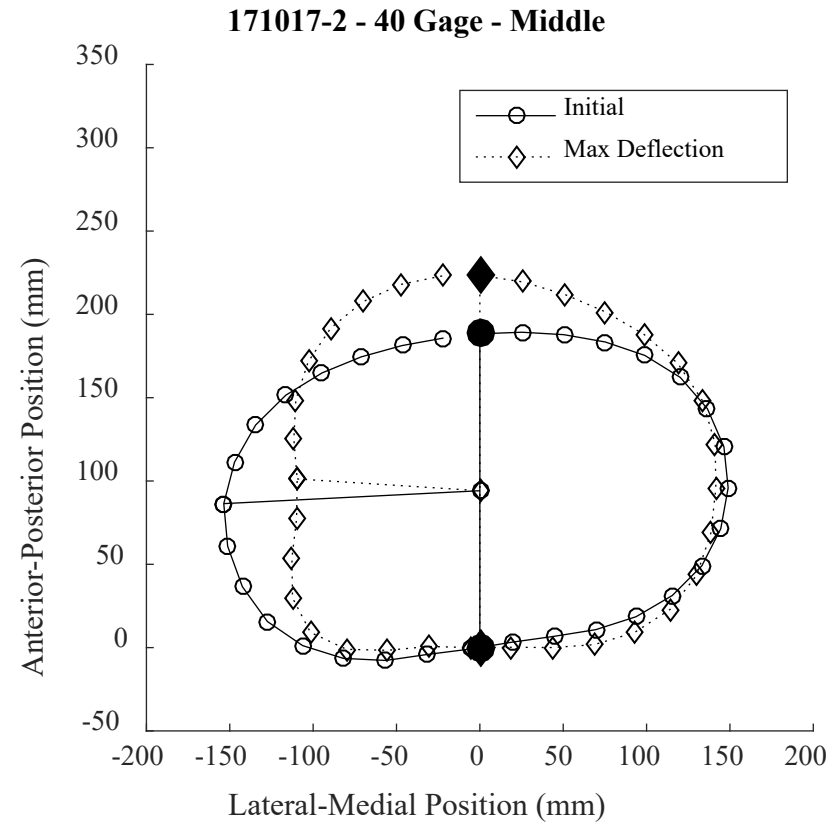


WS 5<sup>th</sup> MCW PLF-2  
Max Deflection = 49.1 mm

# 6.7 m/s Padded Flat Wall (MCW) Middle Band, Test 3

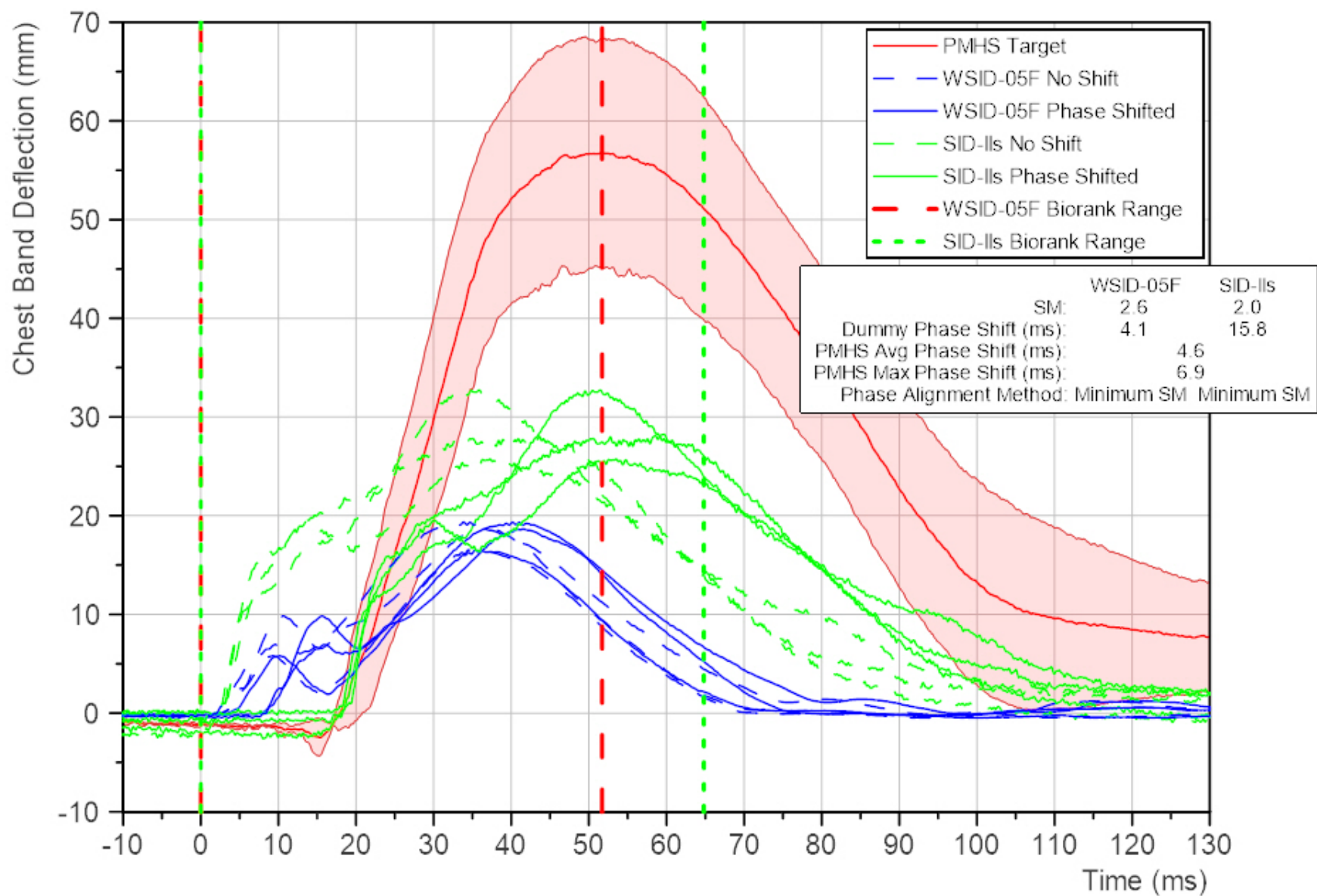


SID-IIs MCW PLF-3  
Max Deflection = 44.1 mm

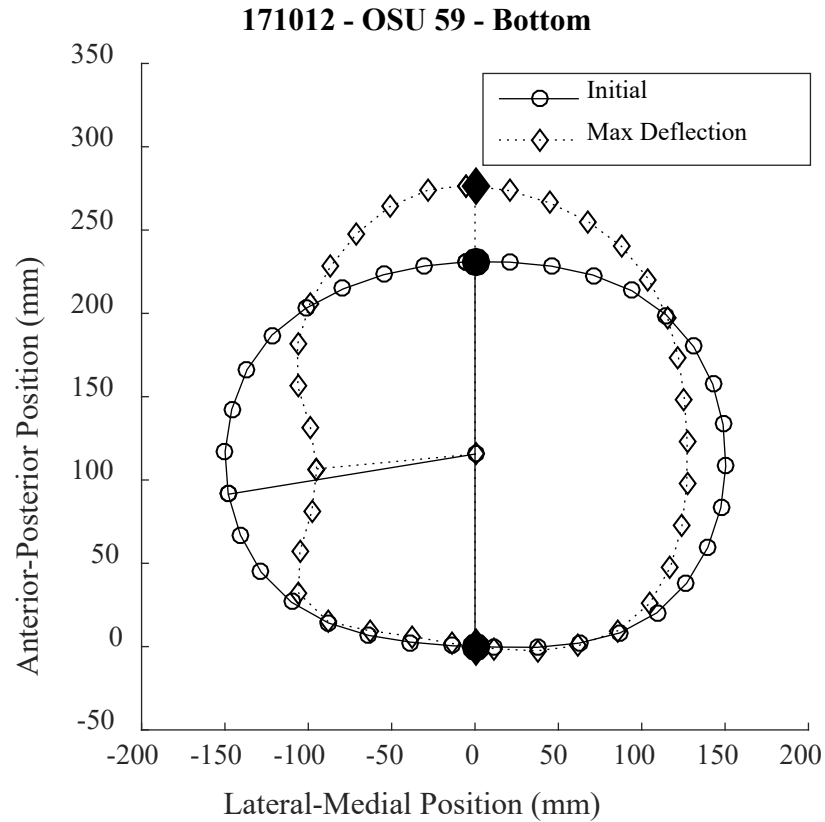


WS 5<sup>th</sup> MCW PLF-3  
Max Deflection = 44.0 mm

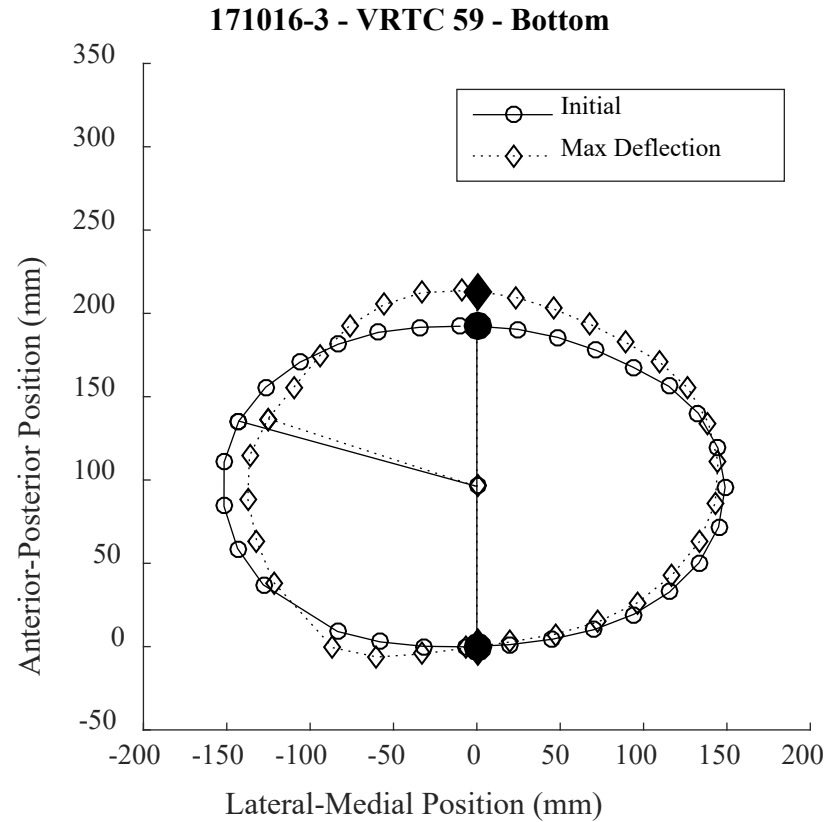
Padded Low-Speed (6.7 m/s) Flat Wall Sled Test  
Abdomen Deflection (CFC1000)



# 6.7 m/s Padded Flat Wall (MCW) Bottom Band, Test 1

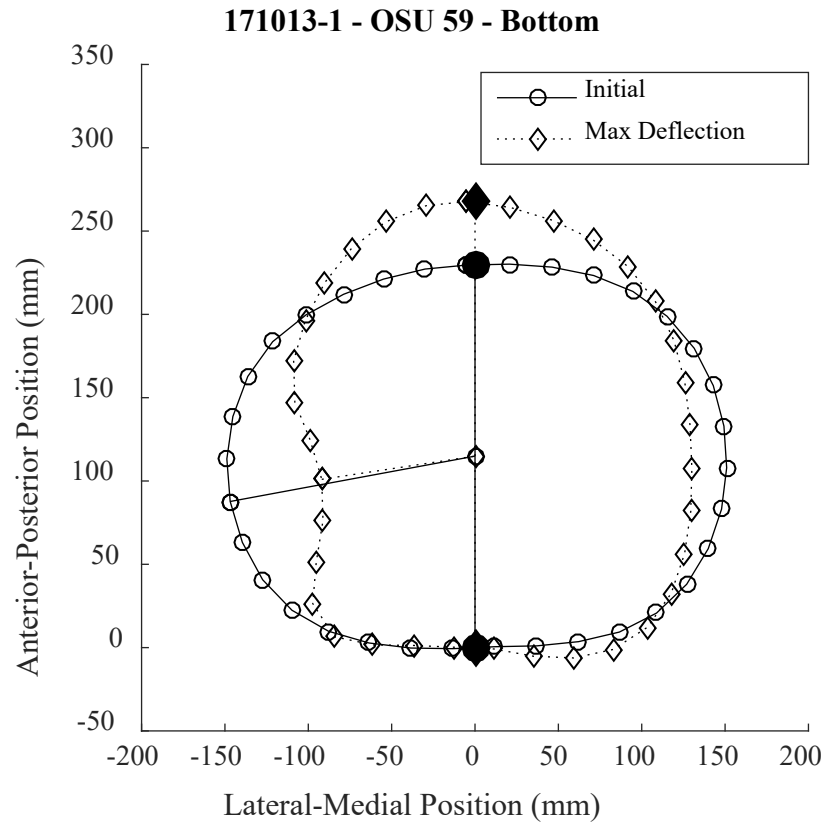


SID-IIs MCW PLF-1  
Max Deflection = 54.7 mm

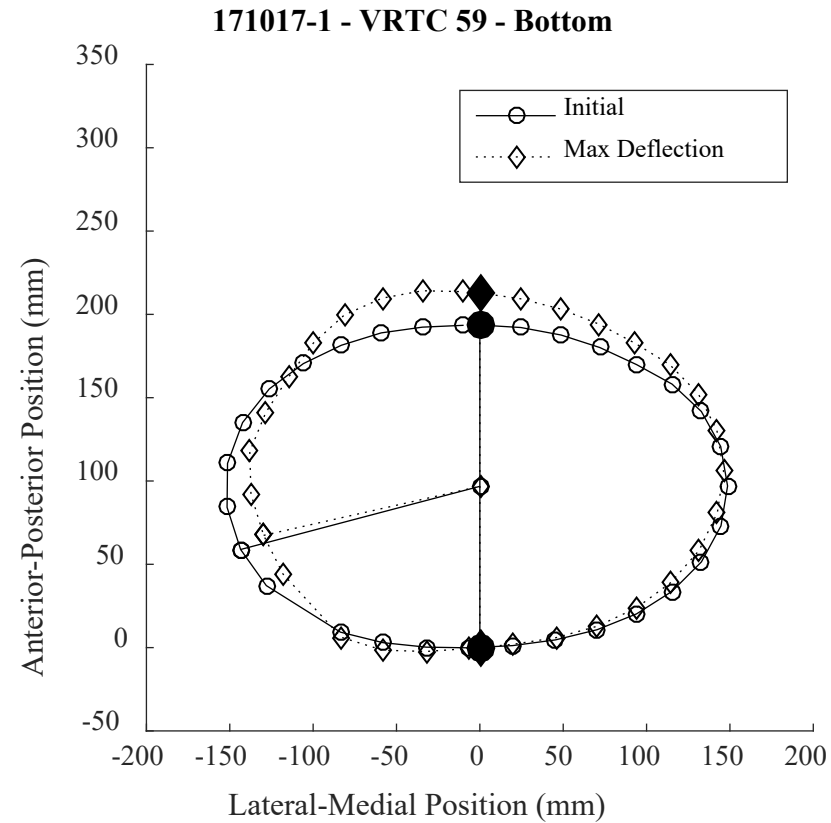


WS 5<sup>th</sup> MCW PLF-1  
Max Deflection = 16.4 mm

# 6.7 m/s Padded Flat Wall (MCW) Bottom Band, Test 2



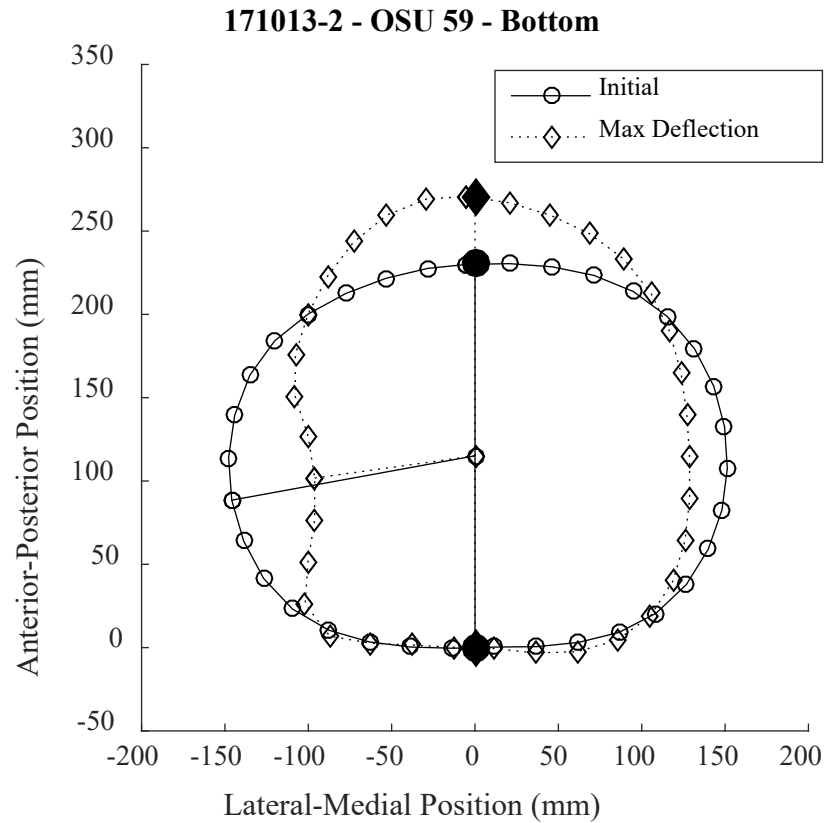
SID-IIs MCW PLF-2  
Max Deflection = 56.4 mm



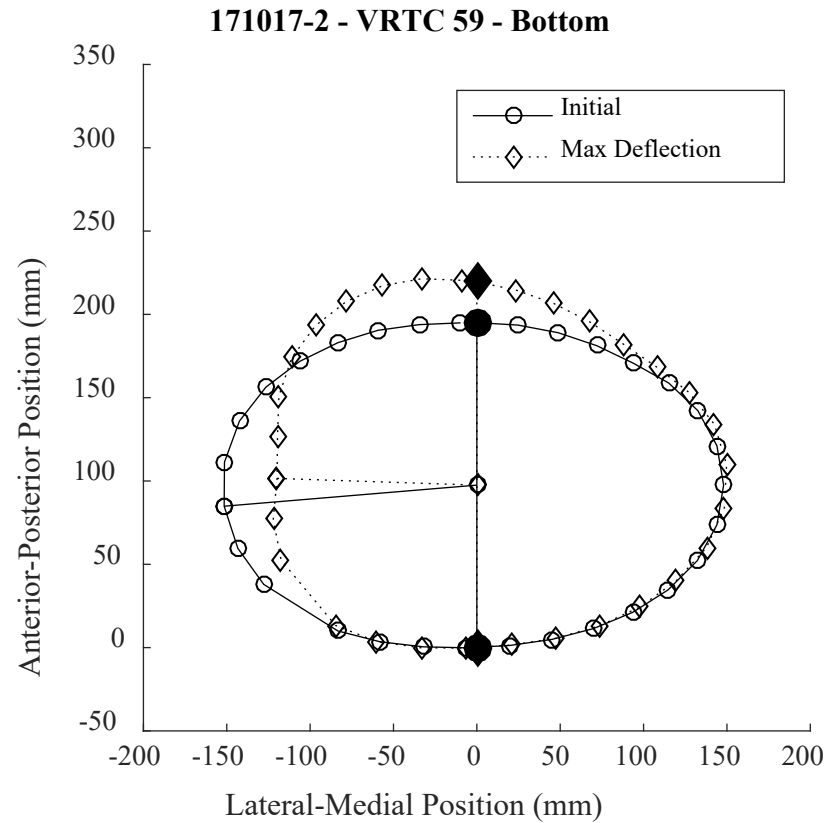
WS 5<sup>th</sup> MCW PLF-2  
Max Deflection = 15.4 mm



# 6.7 m/s Padded Flat Wall (MCW) Bottom Band, Test 3

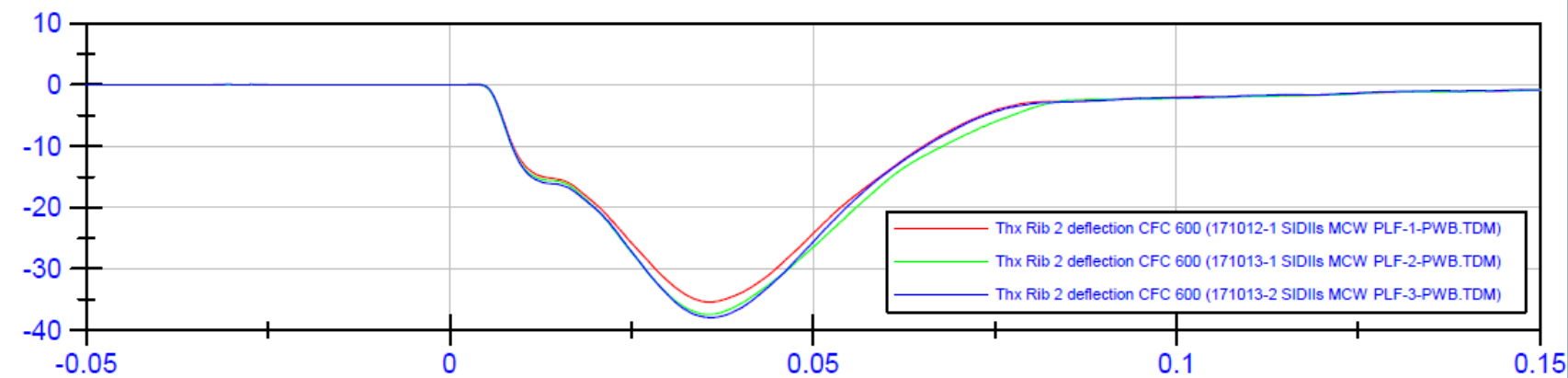
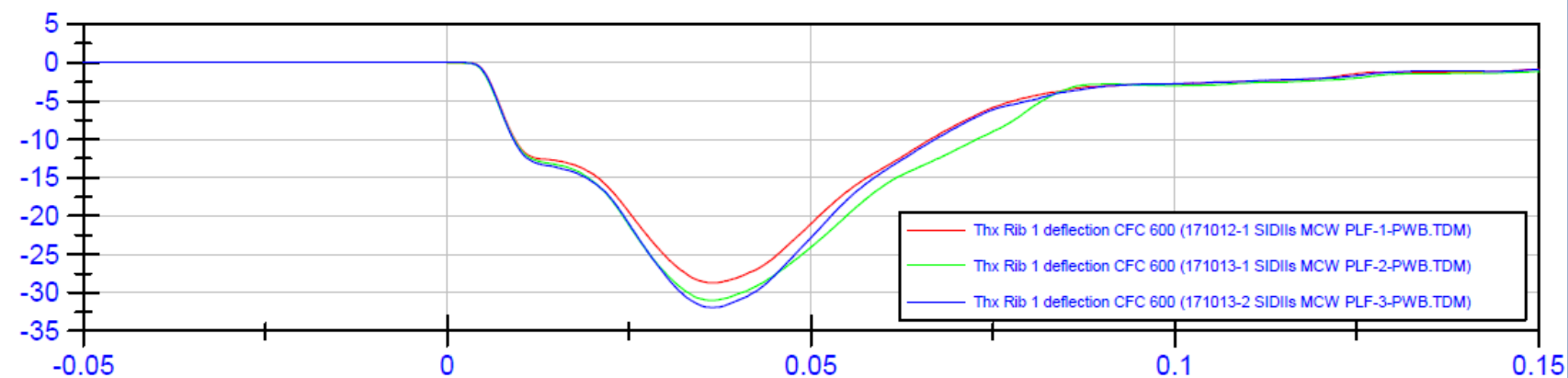
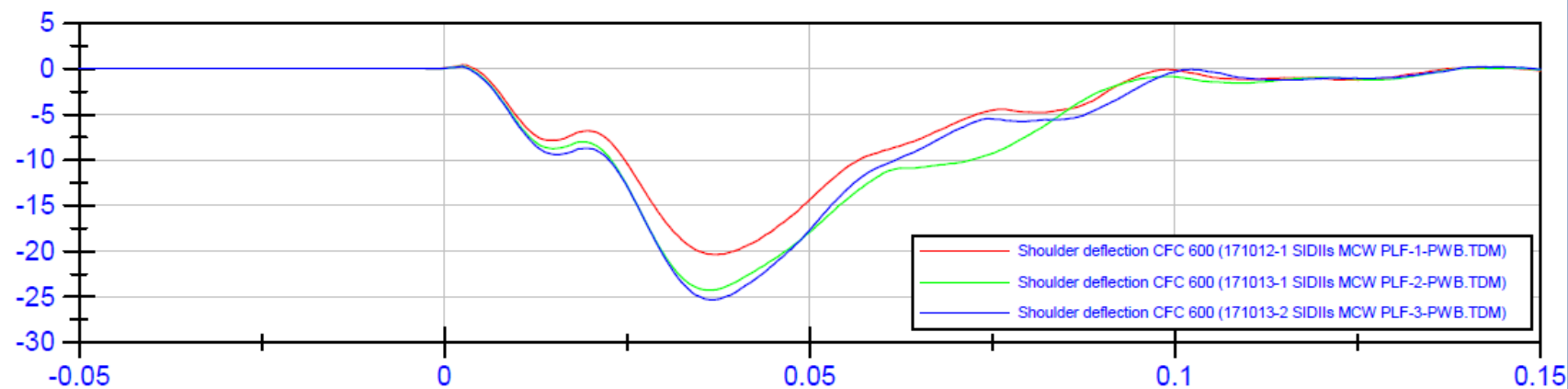


SID-IIs MCW PLF-3  
Max Deflection = 51.3 mm

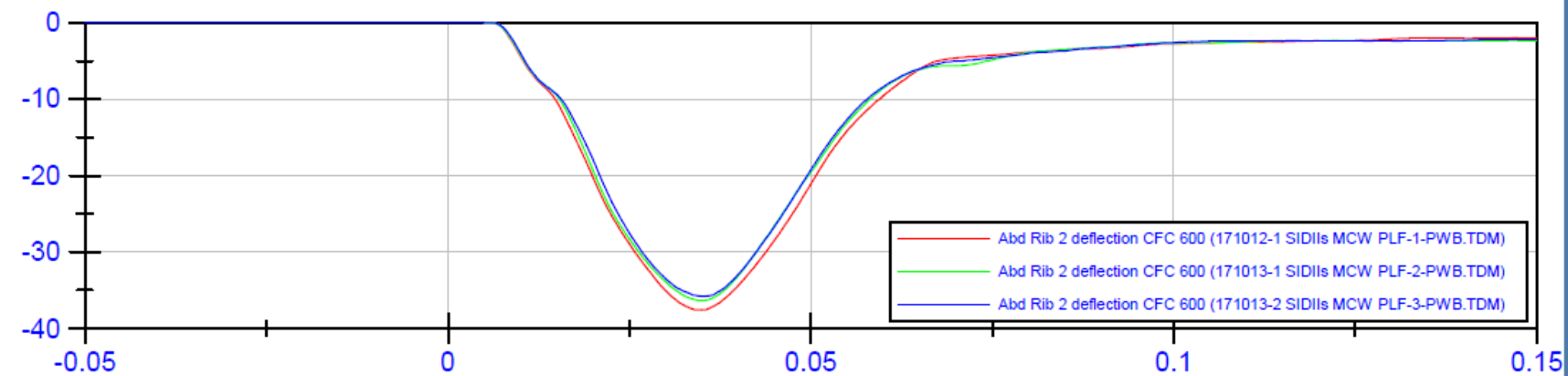
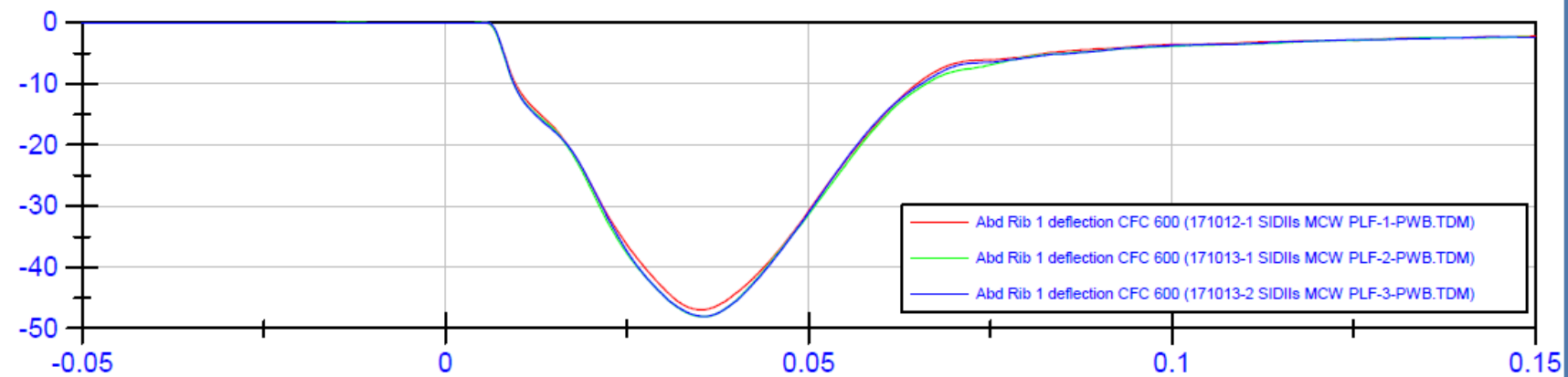
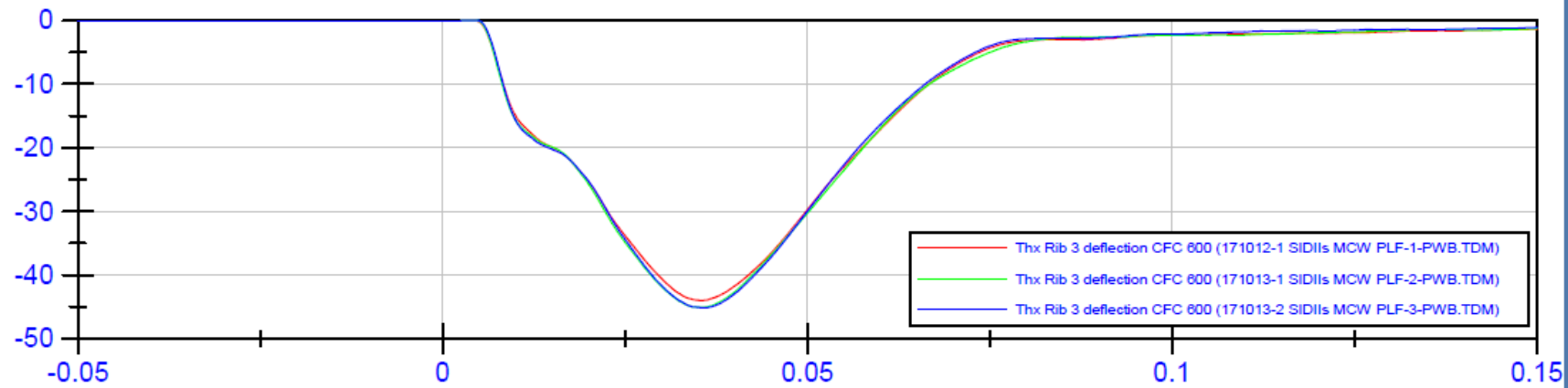


WS 5<sup>th</sup> MCW PLF-3  
Max Deflection = 32.2 mm

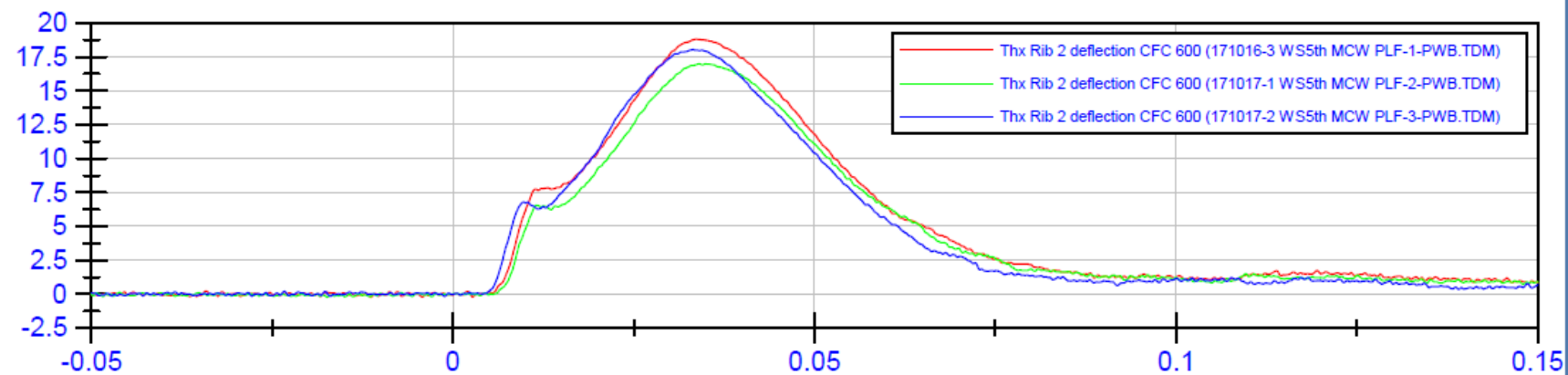
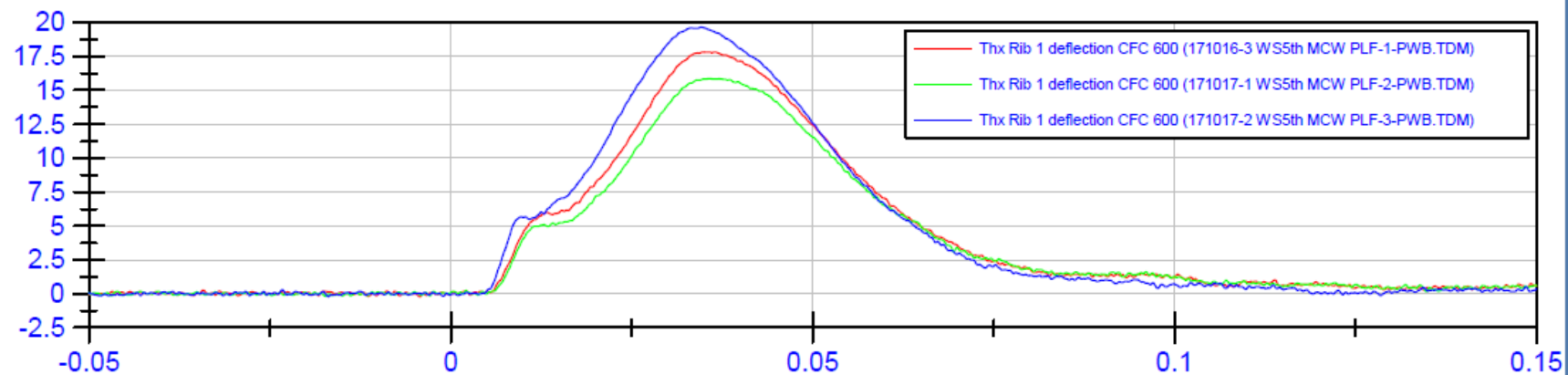
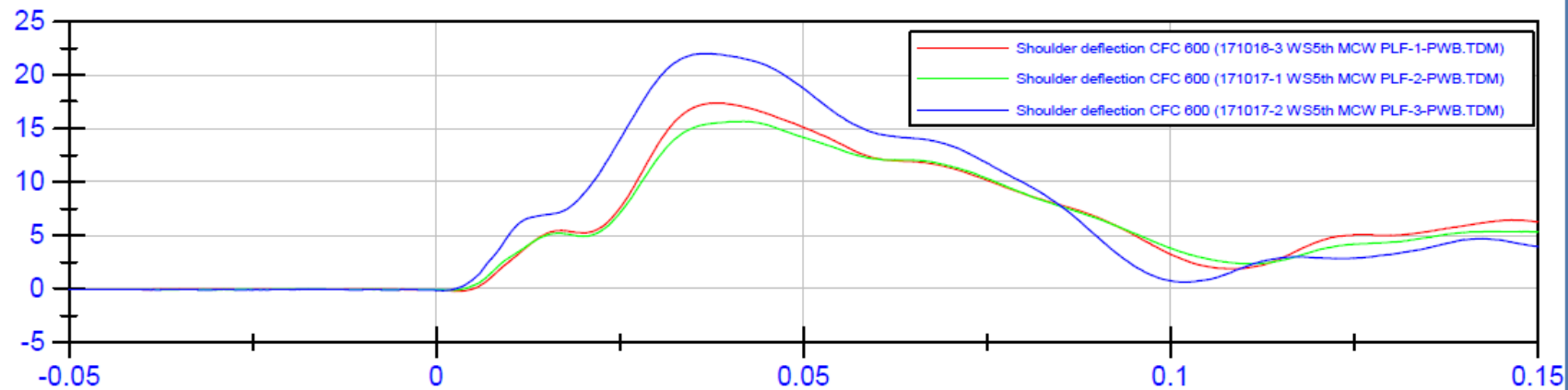
Dummy instrumentation  
SID-IIs 6.7 m/s padded flat wall  
-shoulder  
-thorax rib 1  
-thorax rib 2



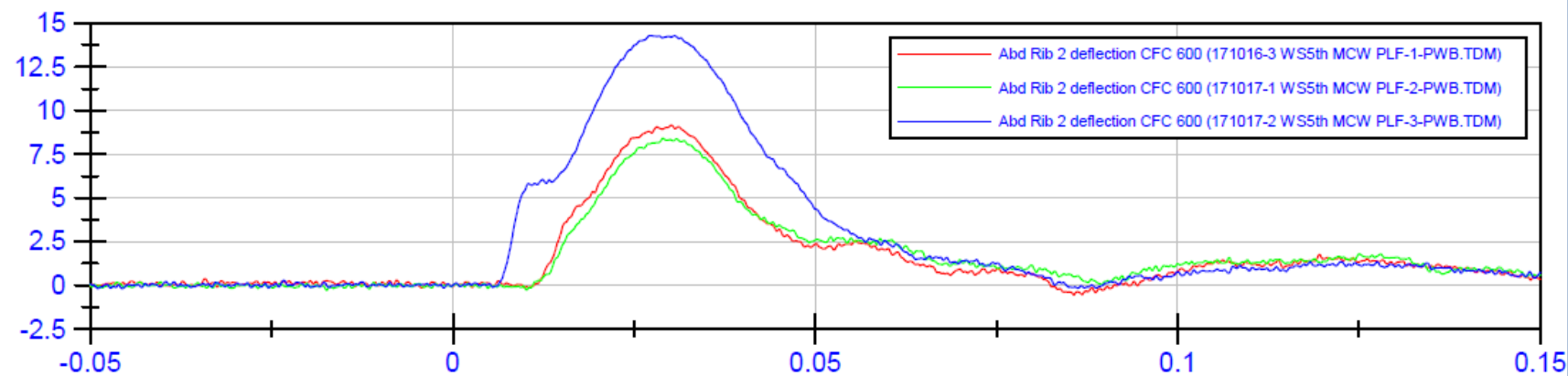
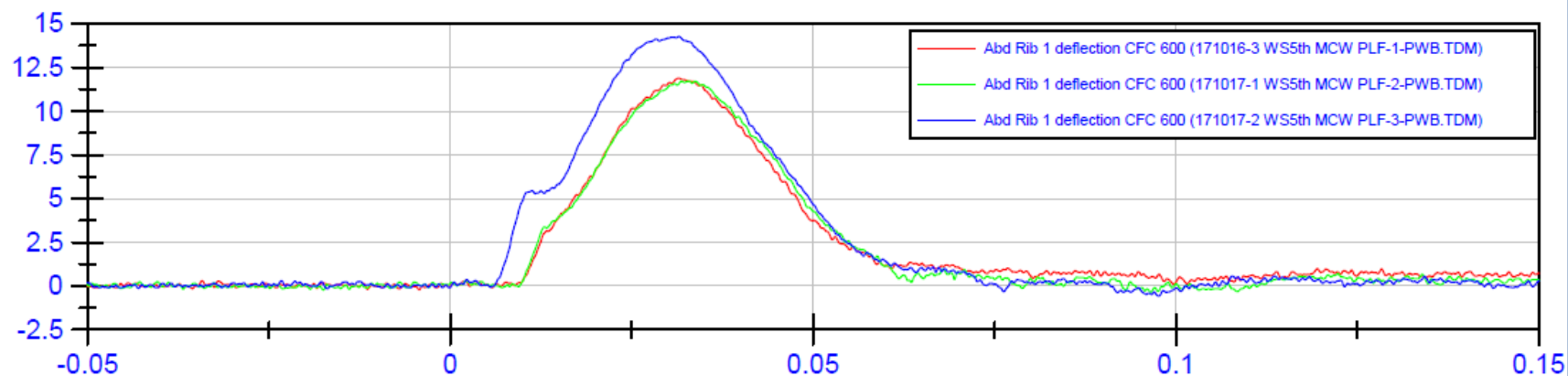
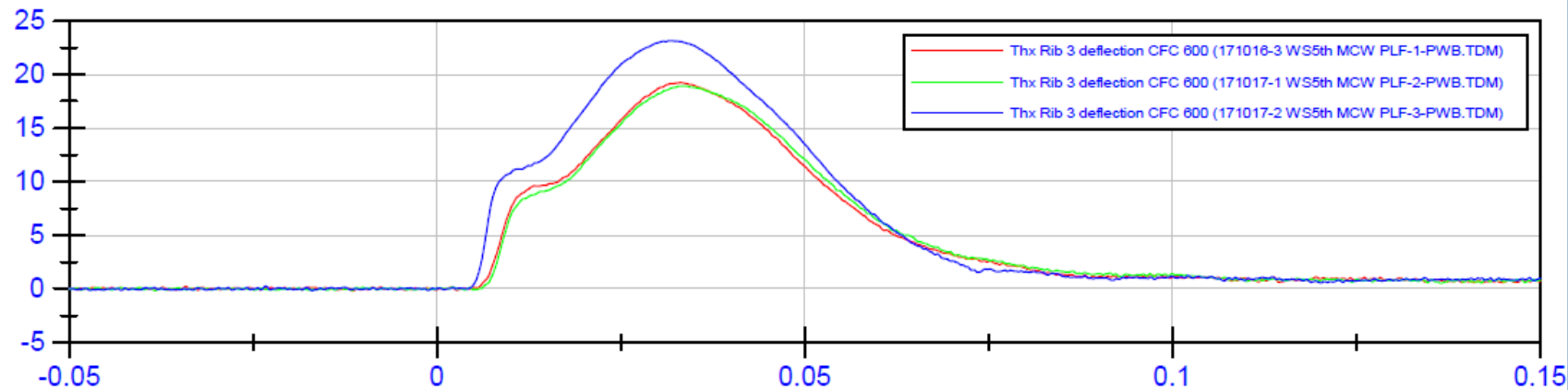
Dummy instrumentation  
SID-IIs 6.7 m/s padded flat wall  
-thorax rib 3  
-abdomen rib 1  
-abdomen rib 2



Dummy instrumentation  
WS 5th 6.7 m/s padded flat wall  
-shoulder  
-thorax rib 1  
-thorax rib 2

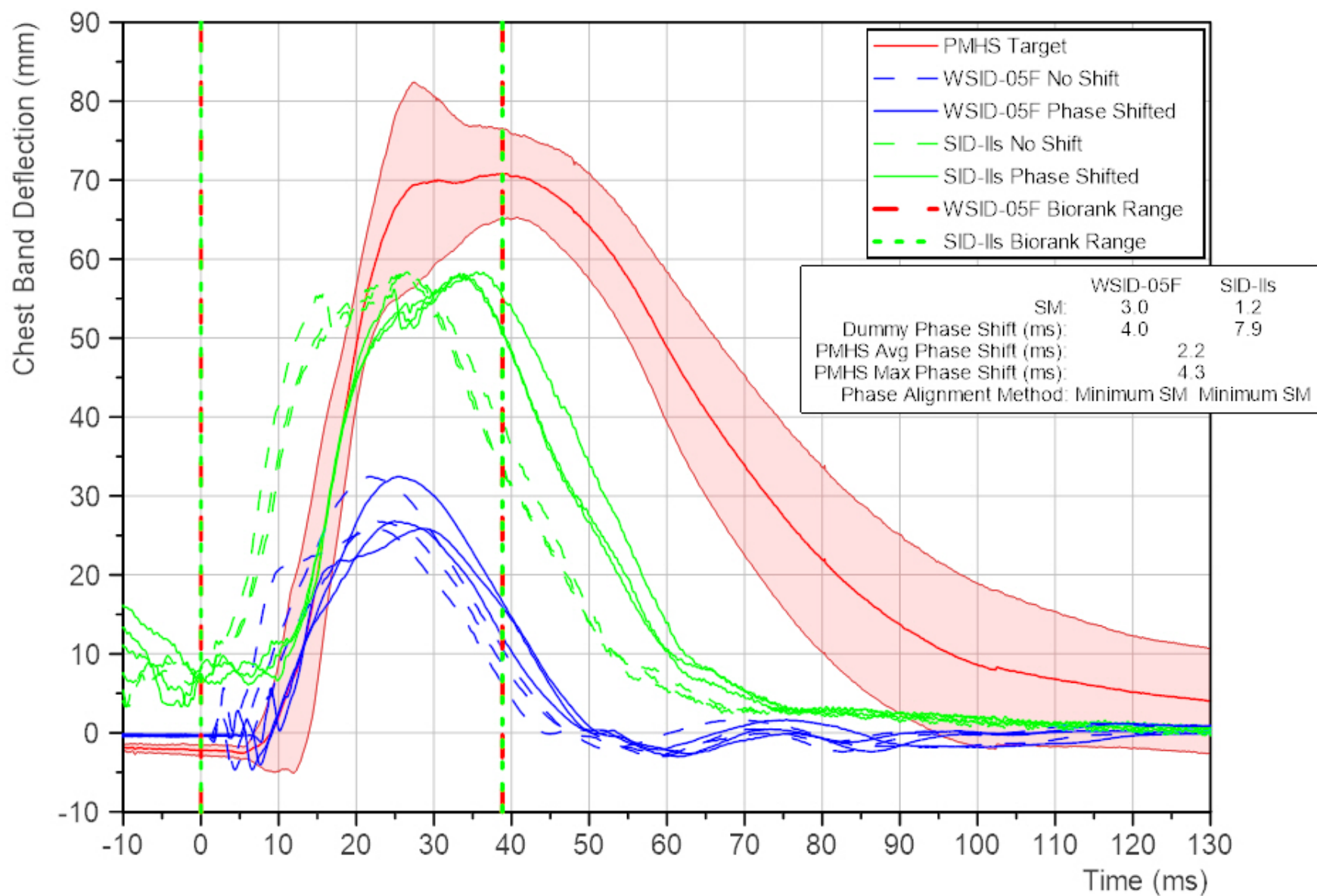


Dummy instrumentation  
WS 5th 6.7 m/s padded flat wall  
-thorax rib 3  
-abdomen rib 1  
-abdomen rib 2

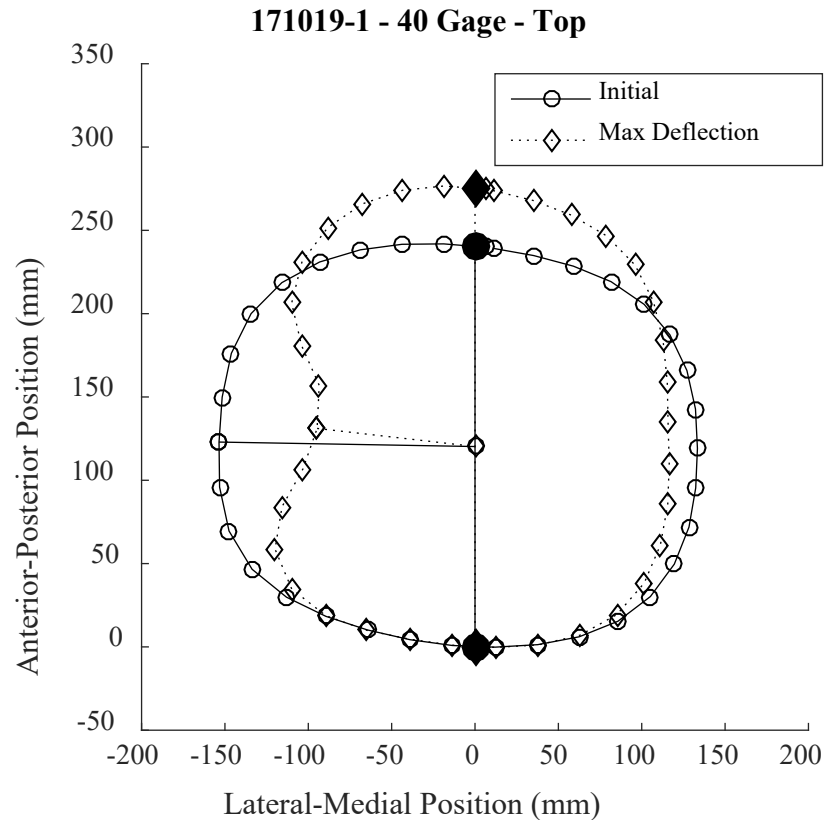


6.7 m/s Rigid Flat Wall Sled Test

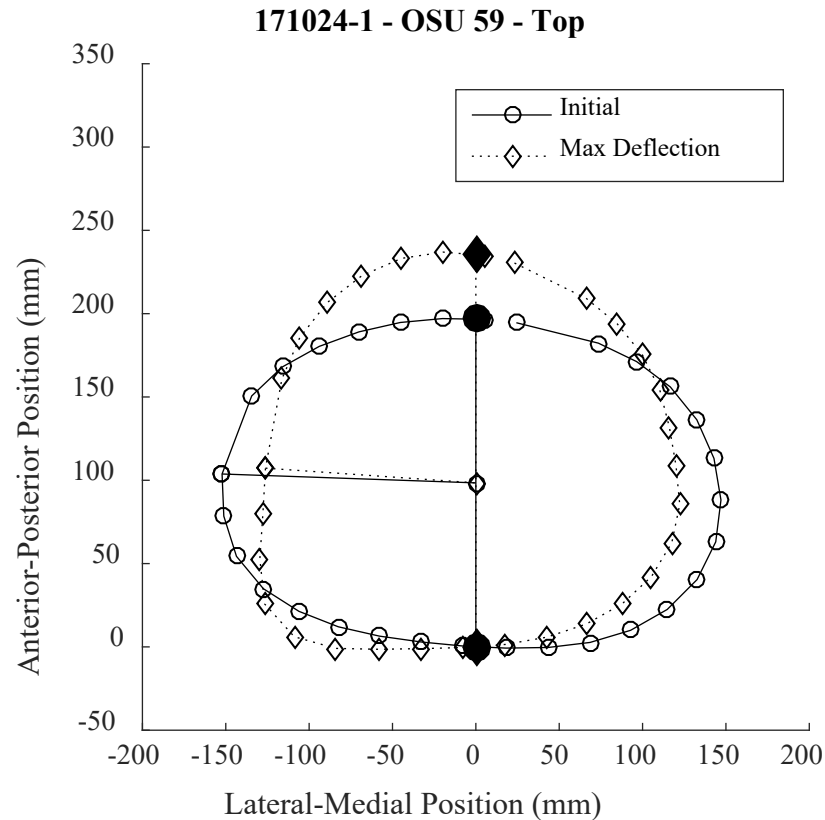
Rigid Low-Speed (6.7 m/s) Flat Wall Sled Test  
Upper Thorax Deflection (CFC1000)



# 6.7 m/s Rigid Flat Wall (MCW) Top Band, Test 1



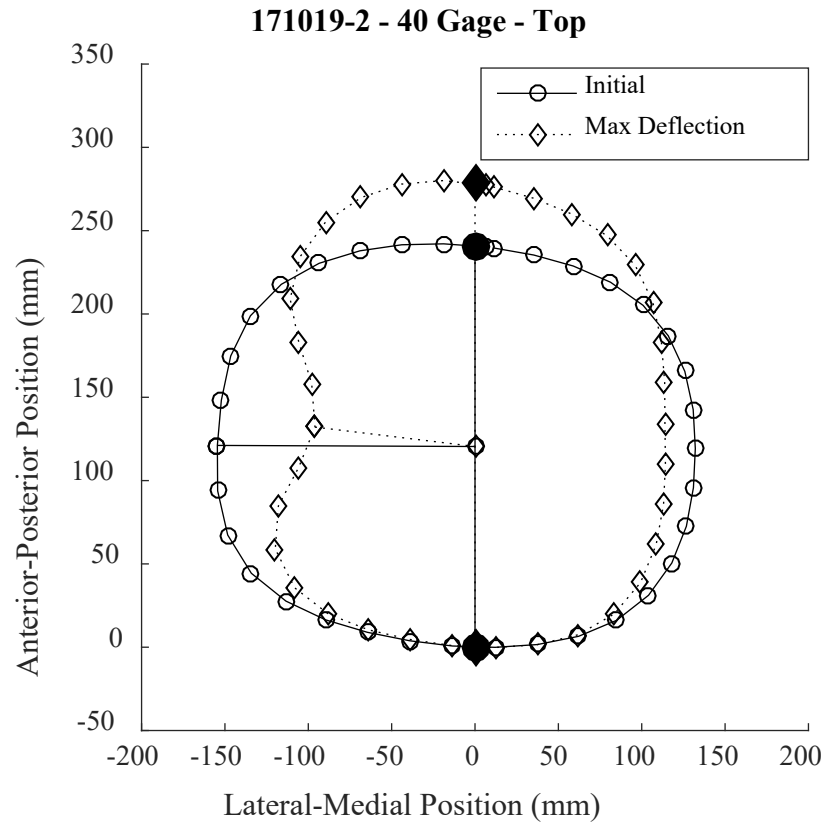
SID-IIs MCW RLF-1  
Max Deflection = 58.2 mm



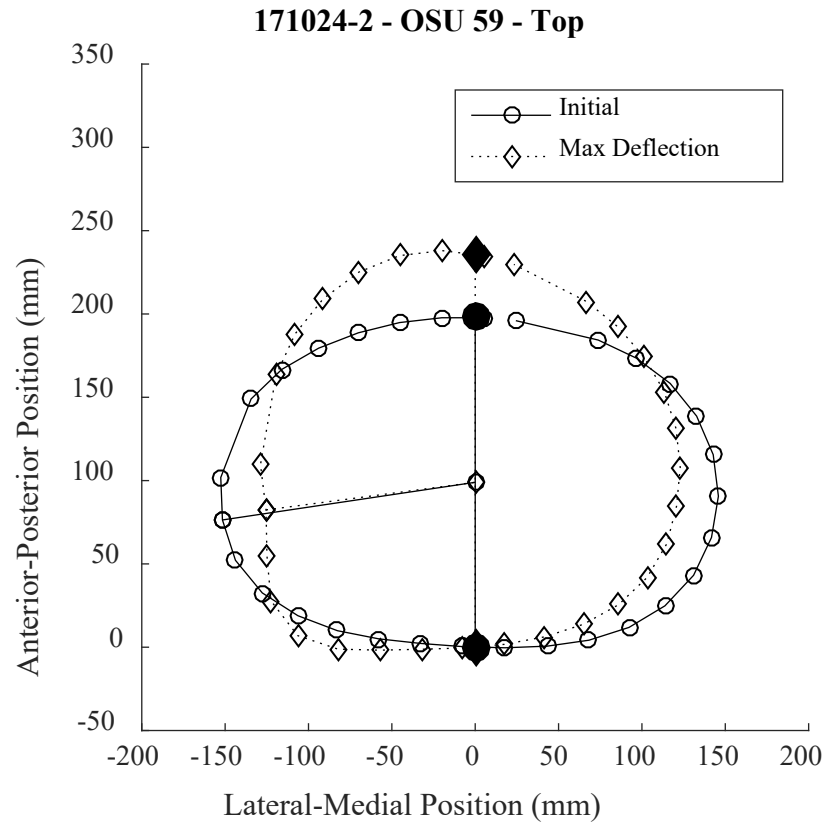
WS 5<sup>th</sup> MCW RLF-1  
Max Deflection = 25.8 mm



# 6.7 m/s Rigid Flat Wall (MCW) Top Band, Test 2

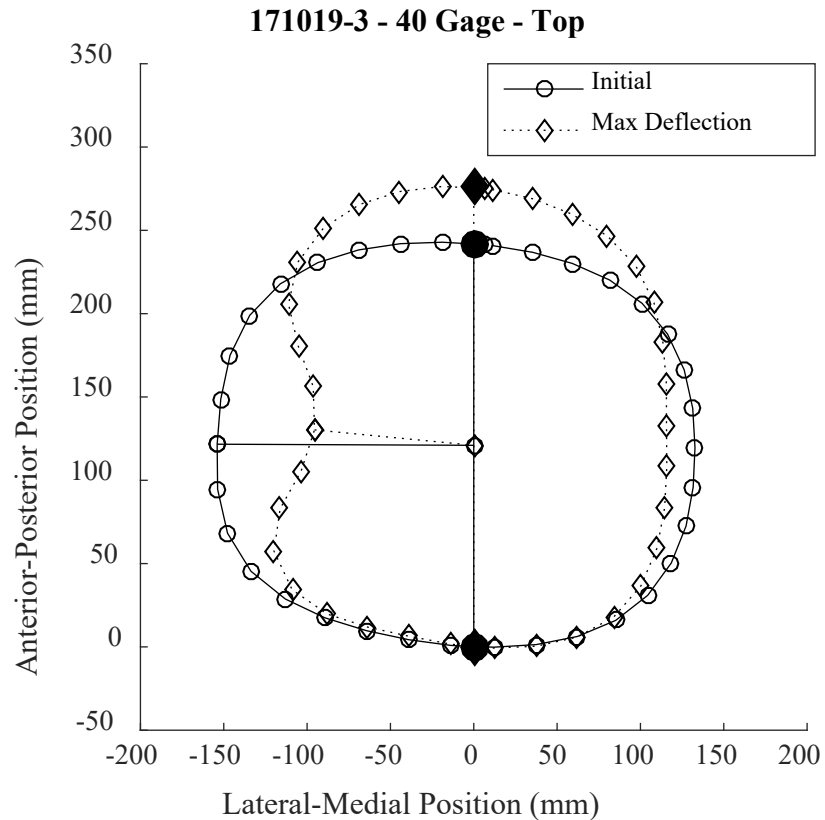


SID-IIs MCW RLF-2  
Max Deflection = 57.8 mm

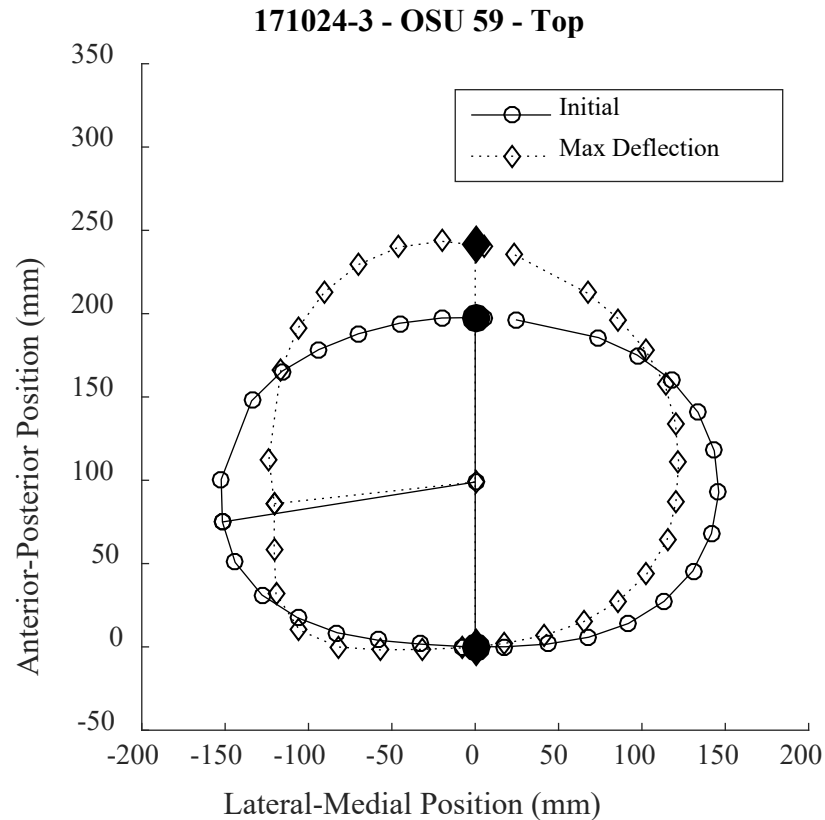


WS 5<sup>th</sup> MCW RLF-2  
Max Deflection = 26.7 mm

# 6.7 m/s Rigid Flat Wall (MCW) Top Band, Test 3

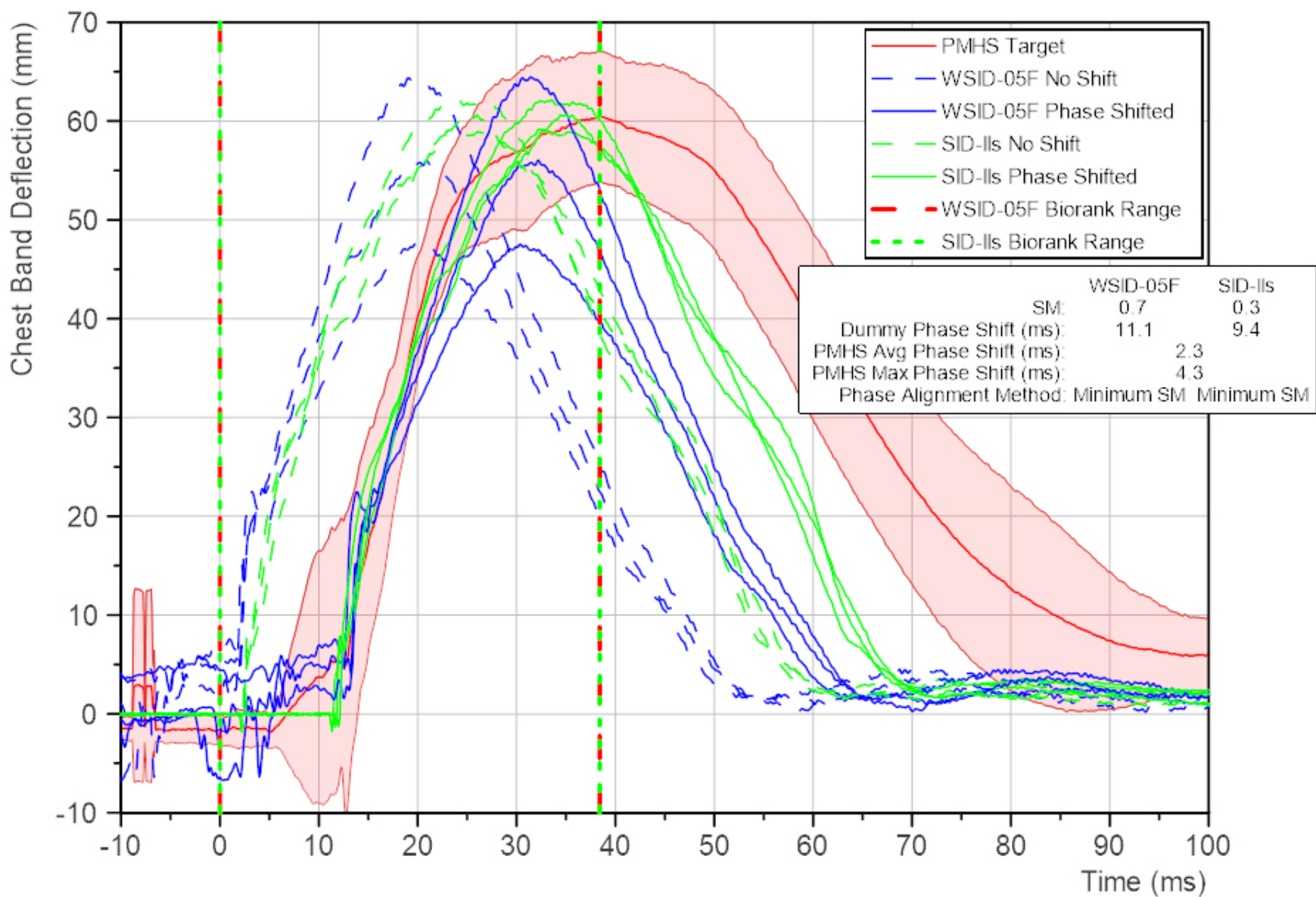


SID-IIs MCW RLF-3  
Max Deflection = 57.9 mm

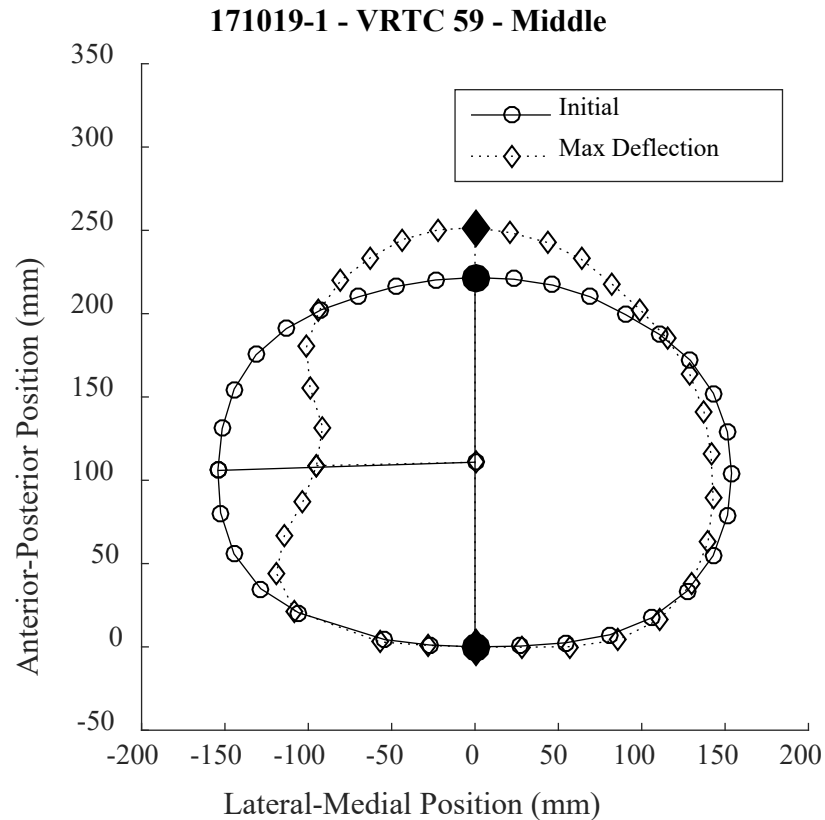


WS 5<sup>th</sup> MCW RLF-3  
Max Deflection = 32.3 mm

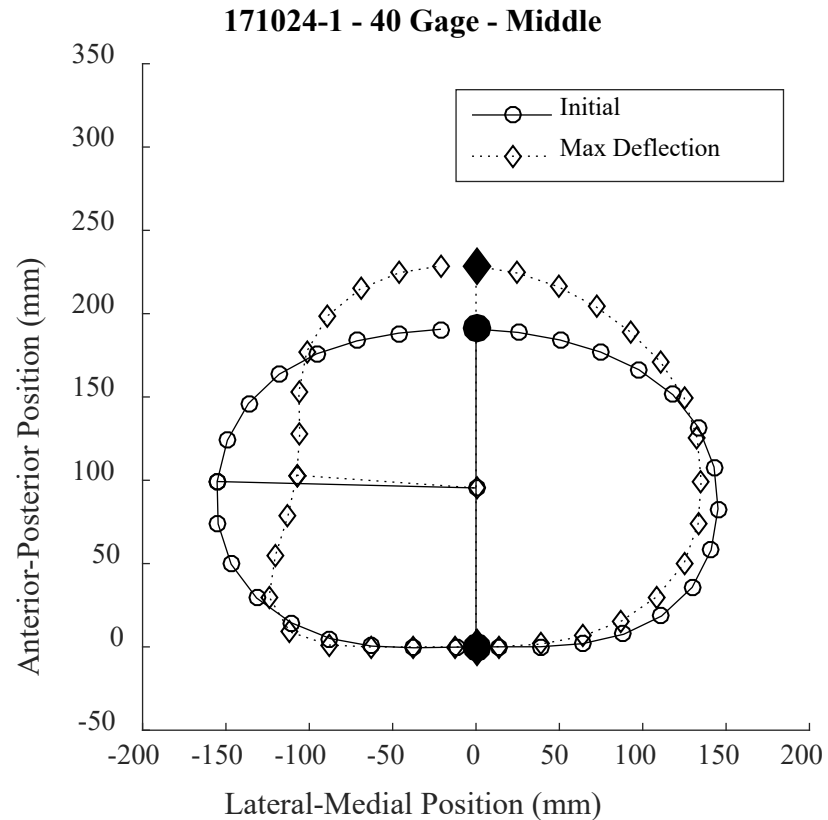
Rigid Low-Speed (6.7 m/s) Flat Wall Sled Test  
Lower Thorax Deflection (CFC1000)



# 6.7 m/s Rigid Flat Wall (MCW) Middle Band, Test 1

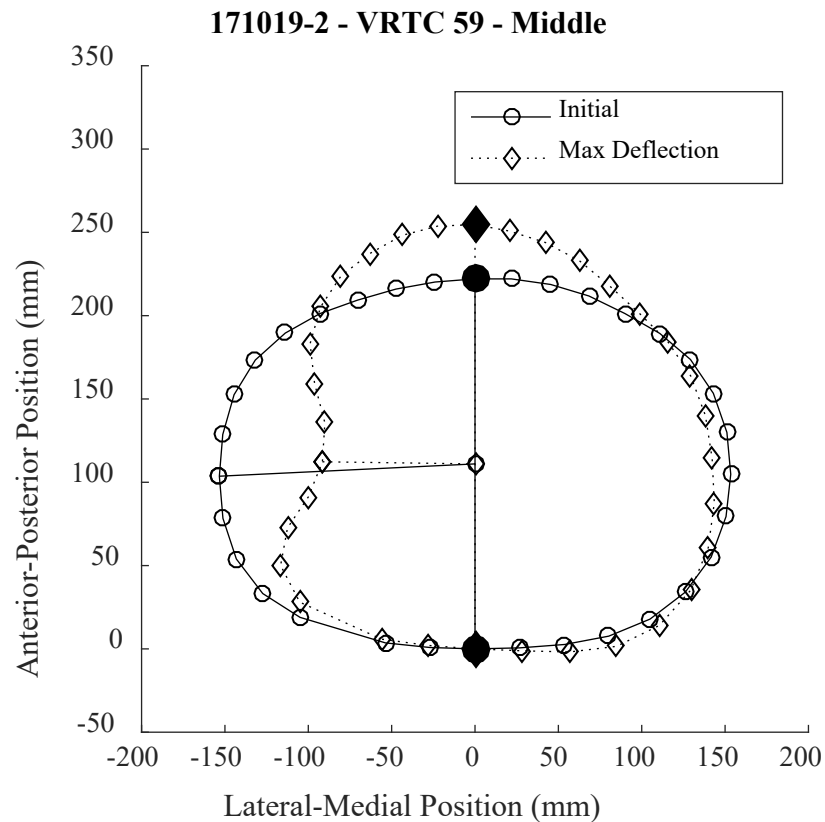


SID-IIs MCW RLF-1  
Max Deflection = 59.2 mm

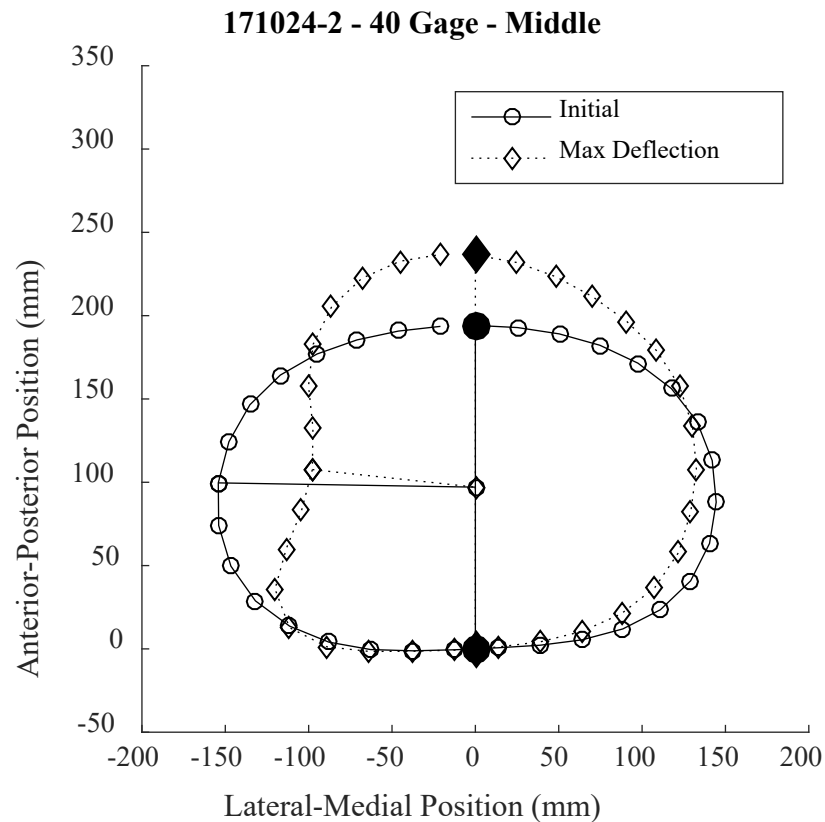


WS 5<sup>th</sup> MCW RLF-1  
Max Deflection = 47.6 mm

# 6.7 m/s Rigid Flat Wall (MCW) Middle Band, Test 2

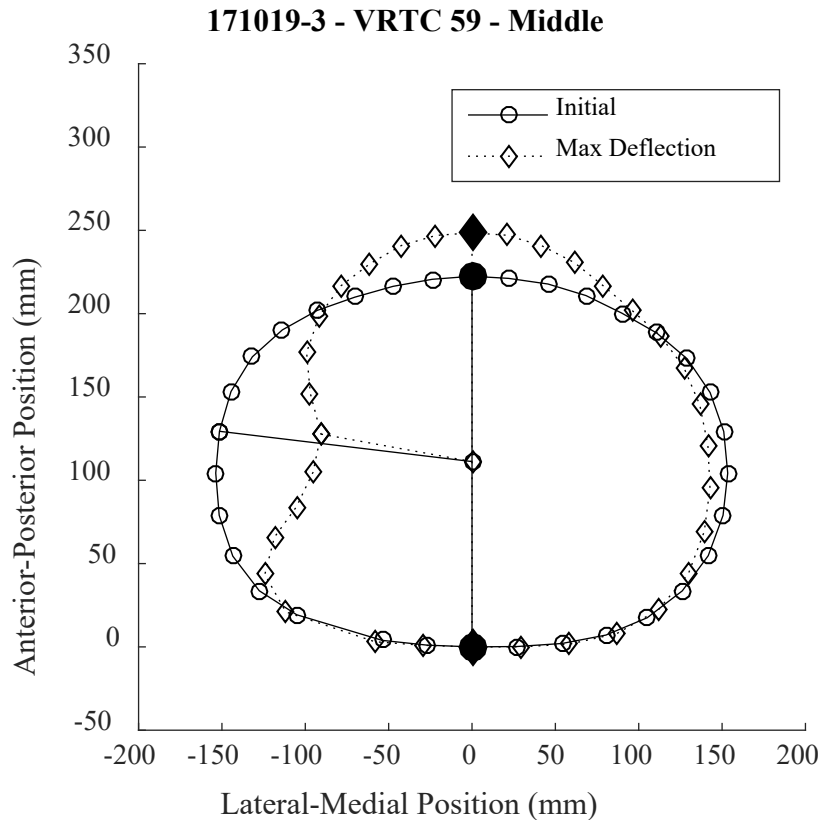


SID-IIs MCW RLF-2  
Max Deflection = 62.0 mm

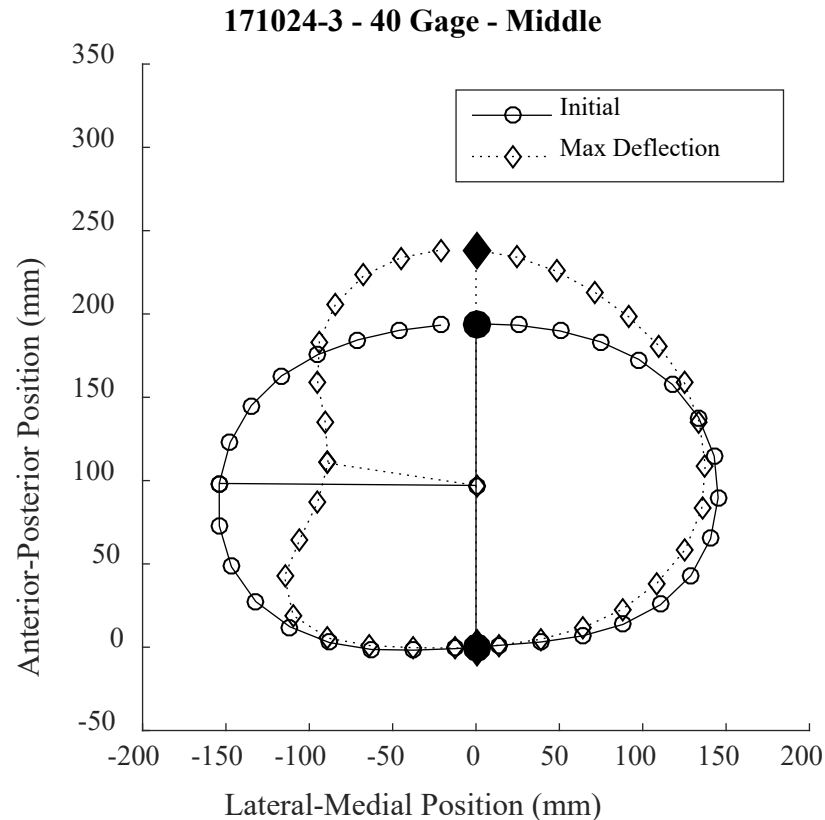


WS 5<sup>th</sup> MCW RLF-2  
Max Deflection = 55.9 mm

# 6.7 m/s Rigid Flat Wall (MCW) Middle Band, Test 3

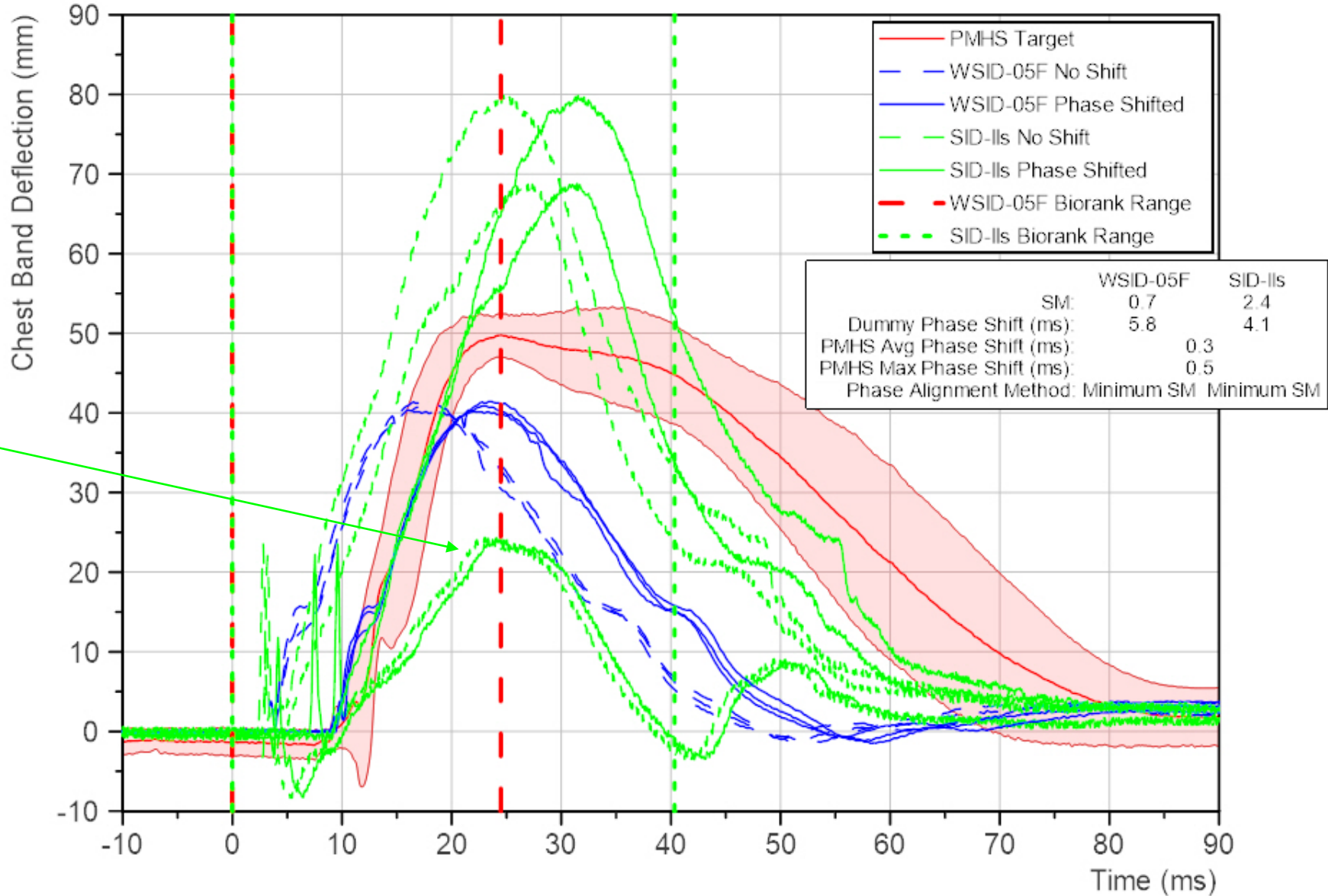


SID-IIs MCW RLF-3  
Max Deflection = 60.5 mm



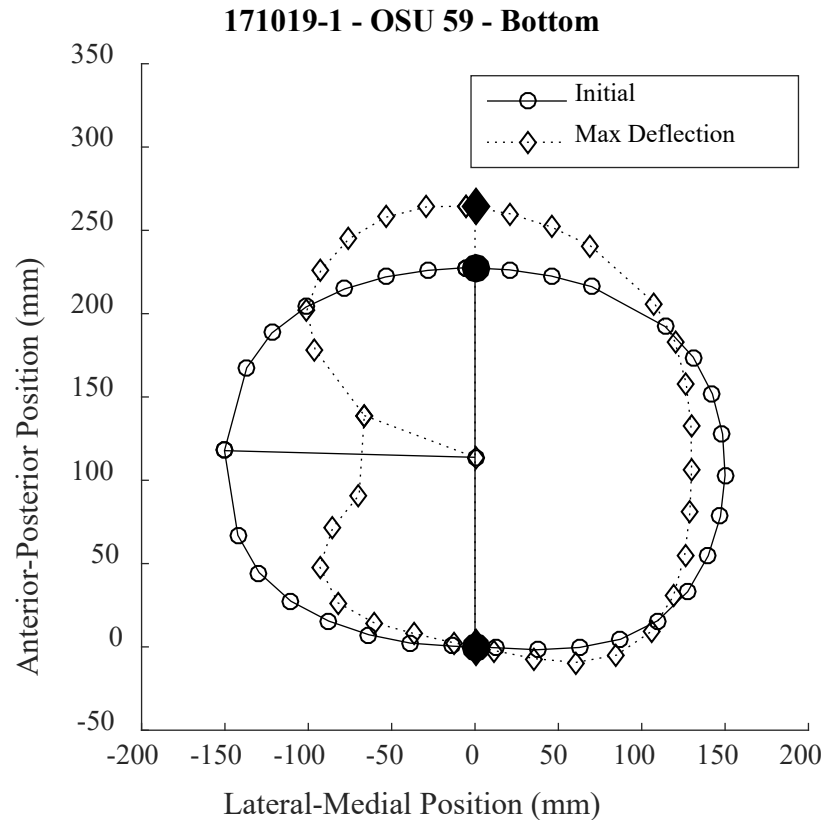
WS 5<sup>th</sup> MCW RLF-3  
Max Deflection = 64.3 mm

Rigid Low-Speed (6.7 m/s) Flat Wall Sled Test  
Abdomen Deflection (CFC1000)

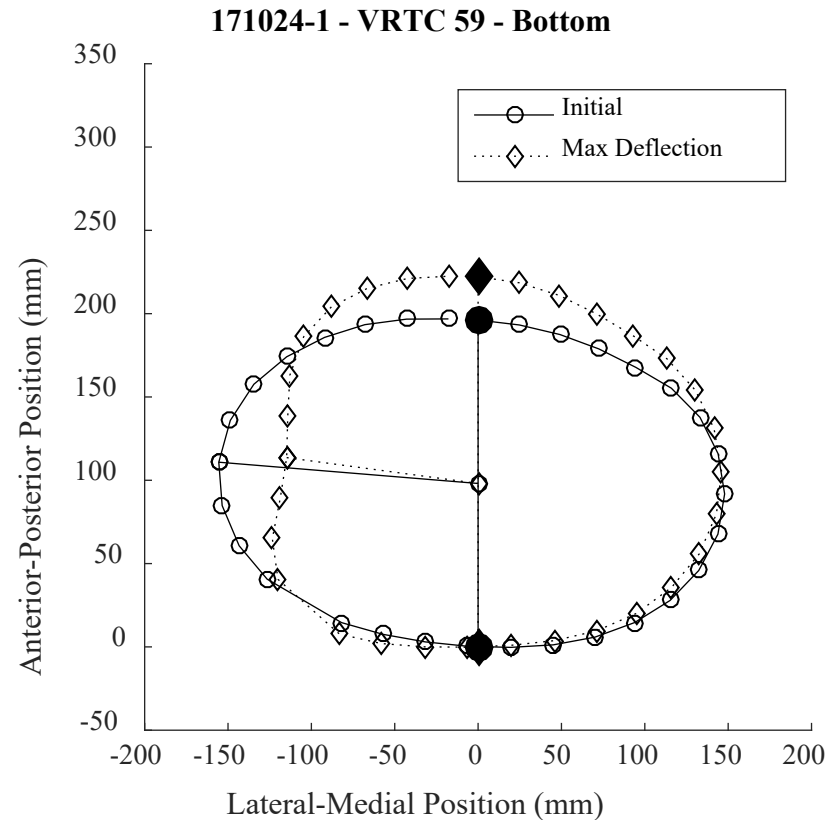


Missing/bad gages on chestband near max deflection in SID-IIs test 2. Should have excluded this data from the biofidelity scores. Revised SM (BRS) score is **1.7**; dummy phase shift is **5.6** ms. Abdomen biofidelity improves from **1.3** to **1.2**. No change to overall SID-IIs biofidelity score of **1.5**.

# 6.7 m/s Rigid Flat Wall (MCW) Bottom Band, Test 1



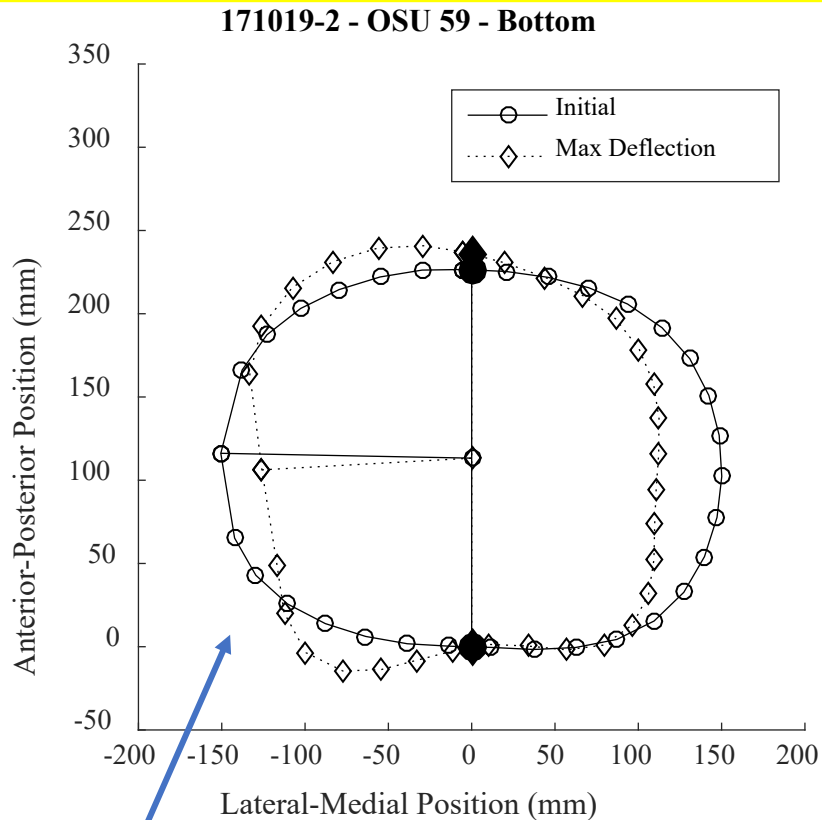
SID-IIs MCW RLF-1  
Max Deflection = 79.4 mm



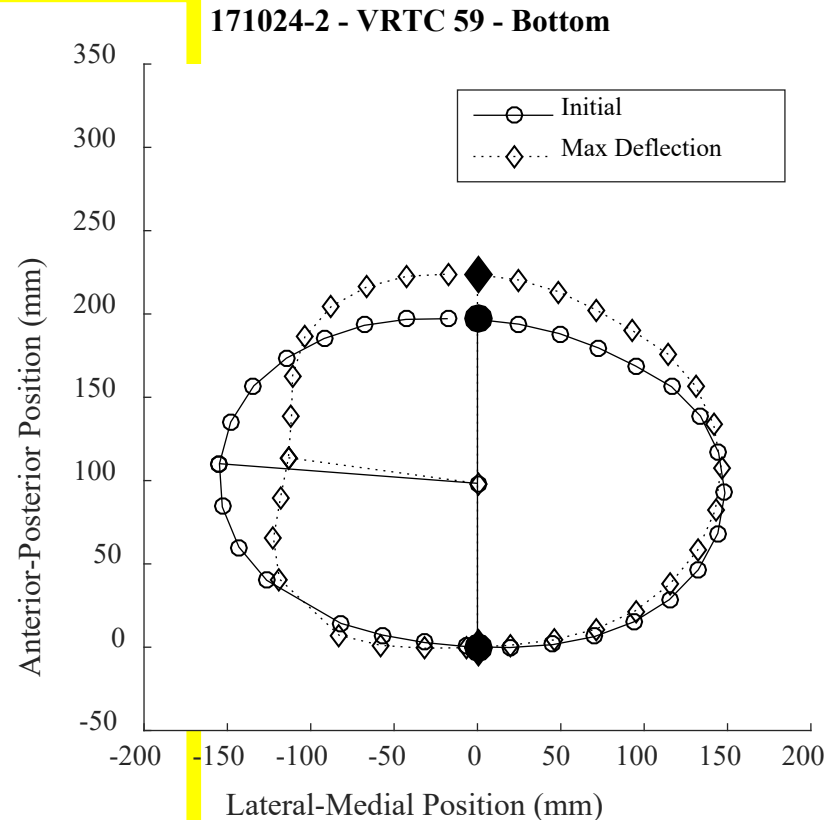
WS 5<sup>th</sup> MCW RLF-1  
Max Deflection = 40.2 mm



# 6.7 m/s Rigid Flat Wall (MCW) Bottom Band, Test 2



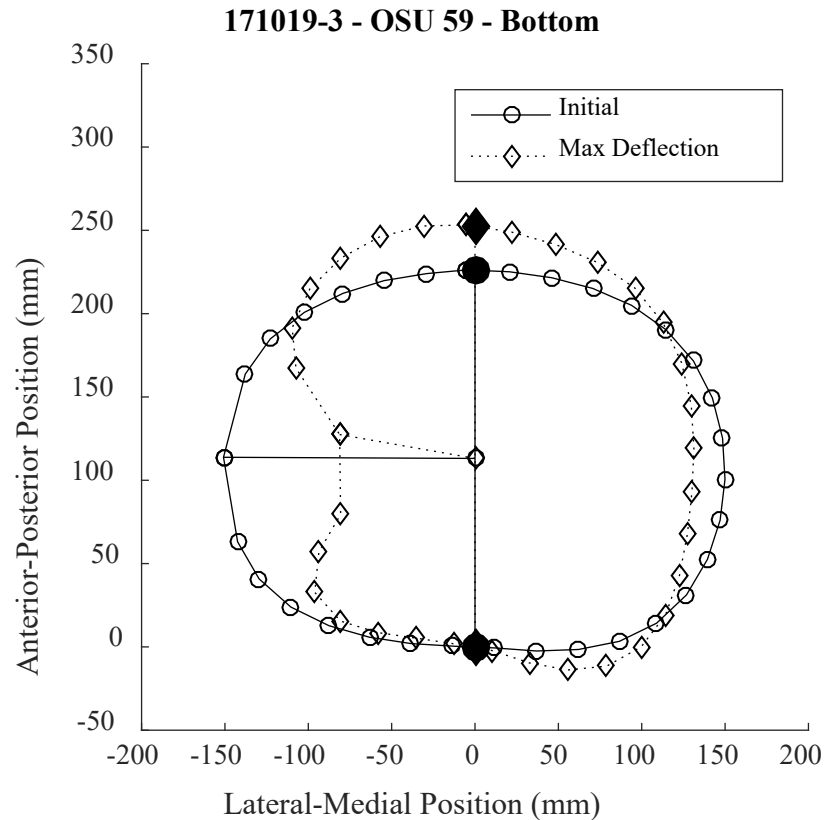
SID-IIs MCW RLF-2  
Max Deflection = 24.5 mm



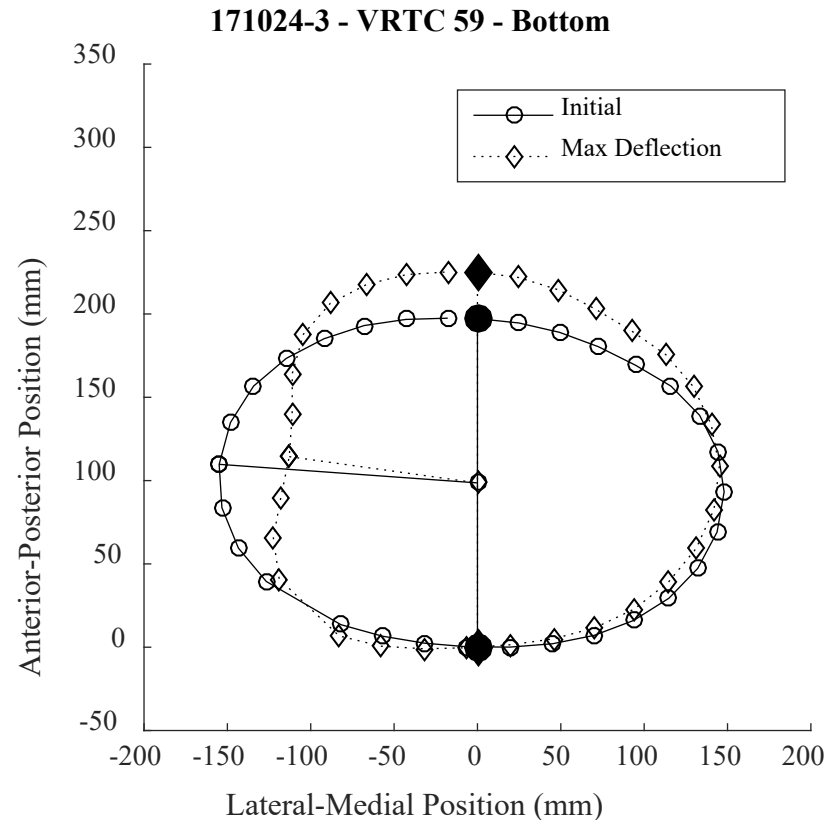
WS 5<sup>th</sup> MCW RLF-2  
Max Deflection = 40.8 mm

This test excluded from BioRank due to too many missing gages

# 6.7 m/s Rigid Flat Wall (MCW) Bottom Band, Test 3

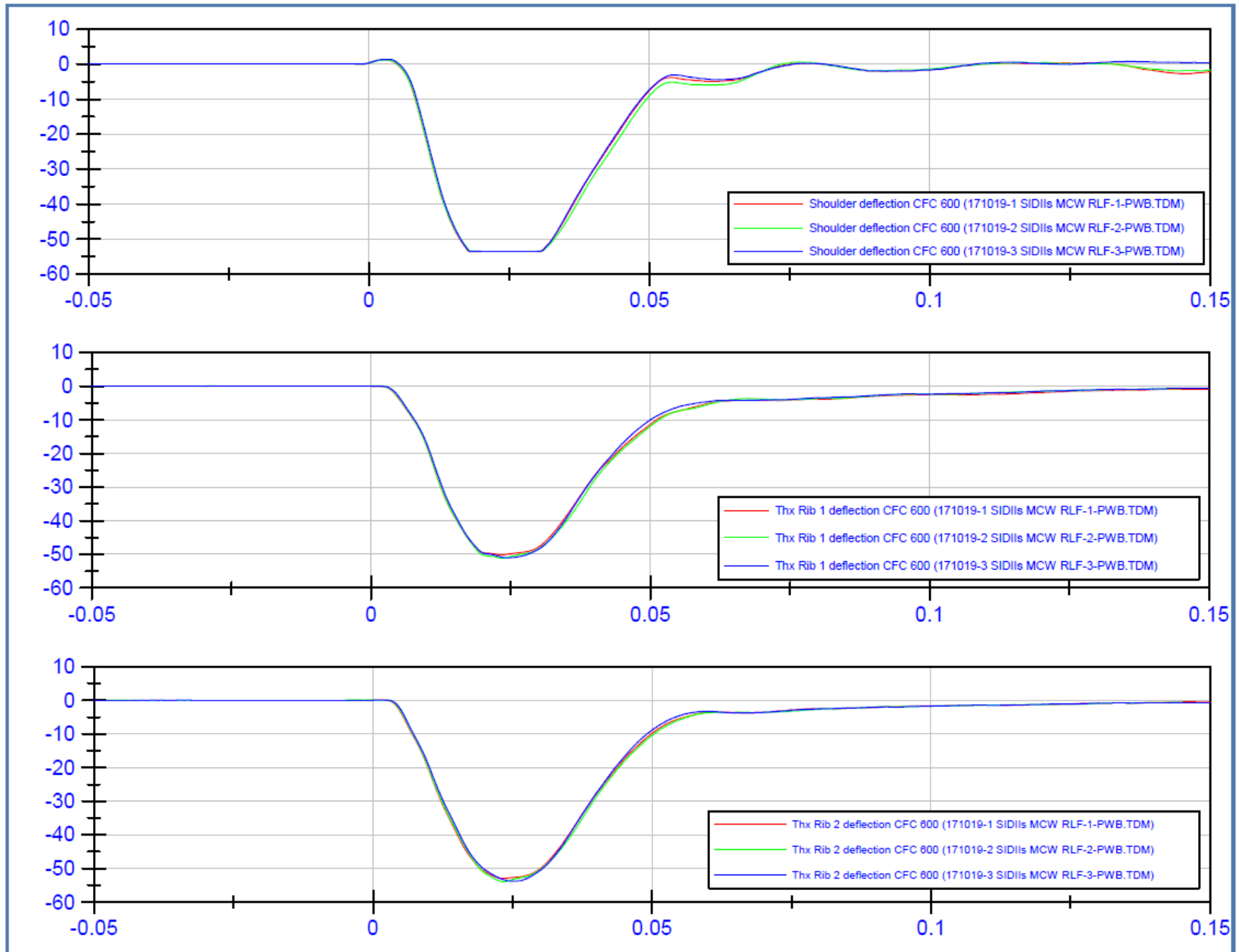


SID-IIs MCW RLF-3  
Max Deflection = 68.4 mm

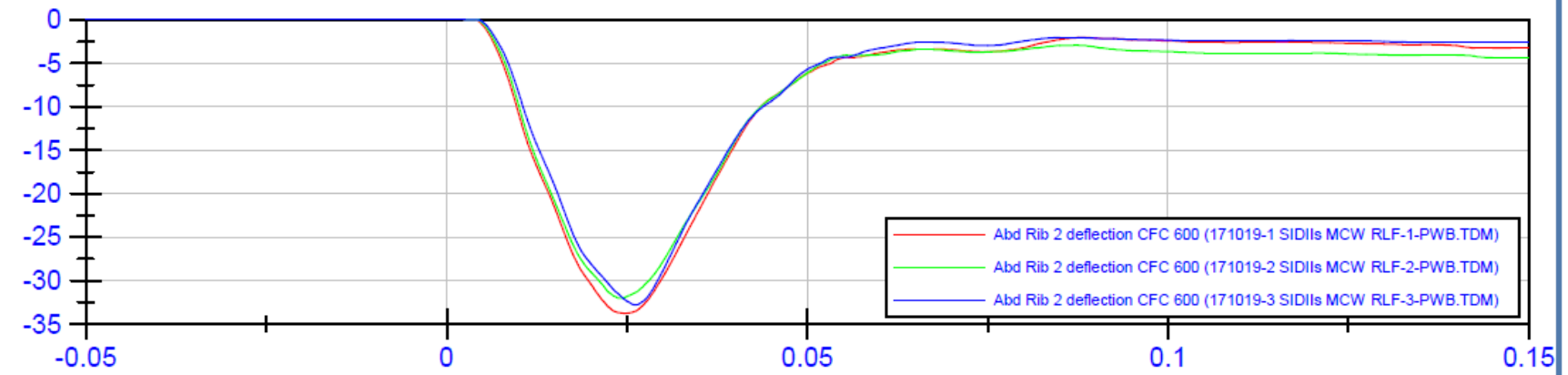
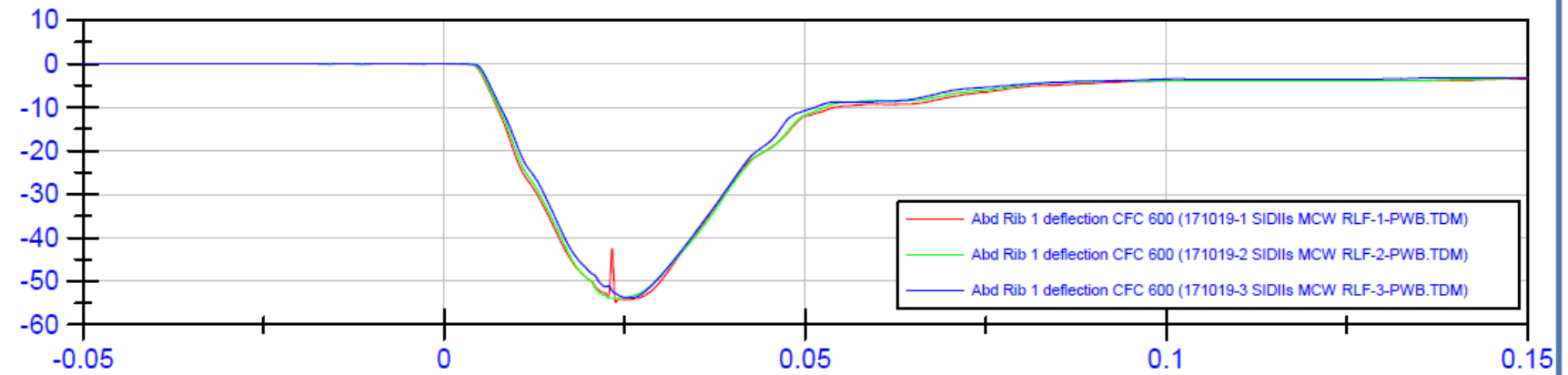
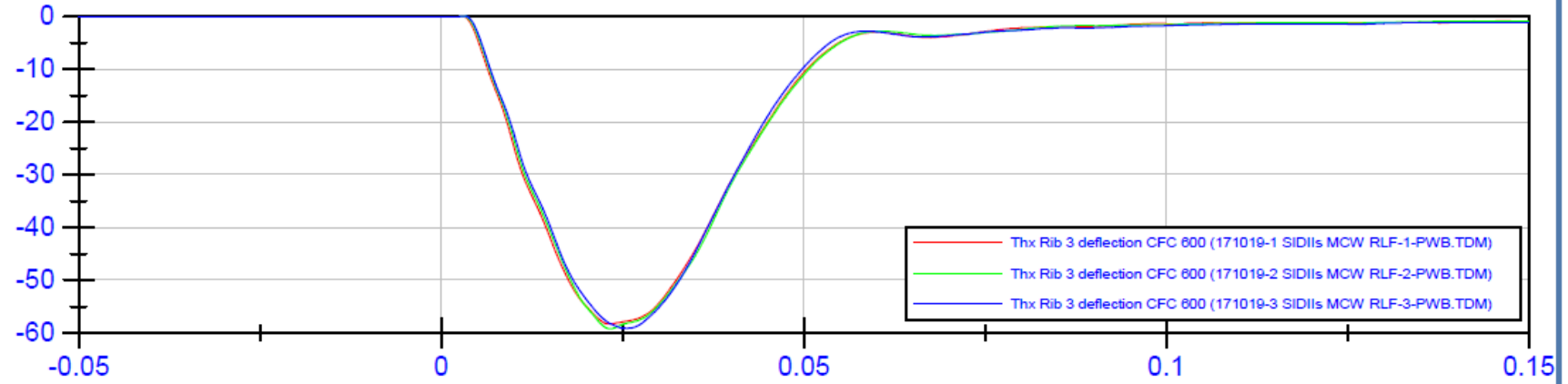


WS 5<sup>th</sup> MCW RLF-3  
Max Deflection = 41.4 mm

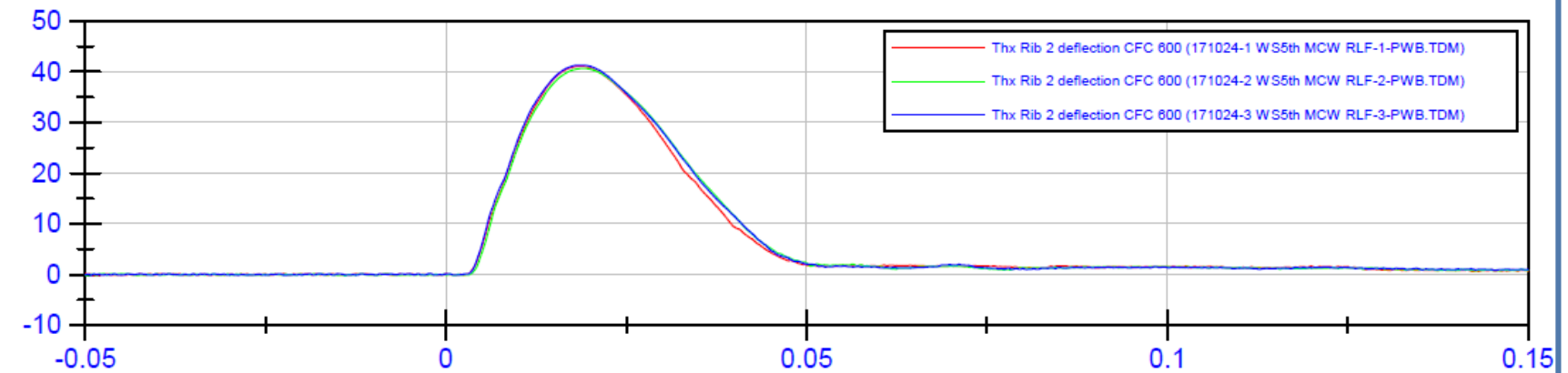
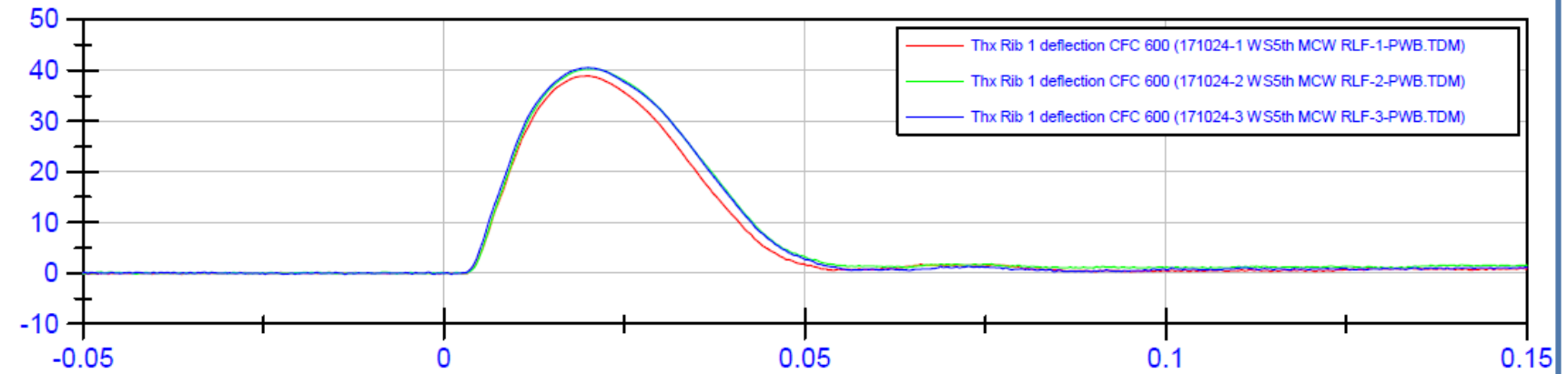
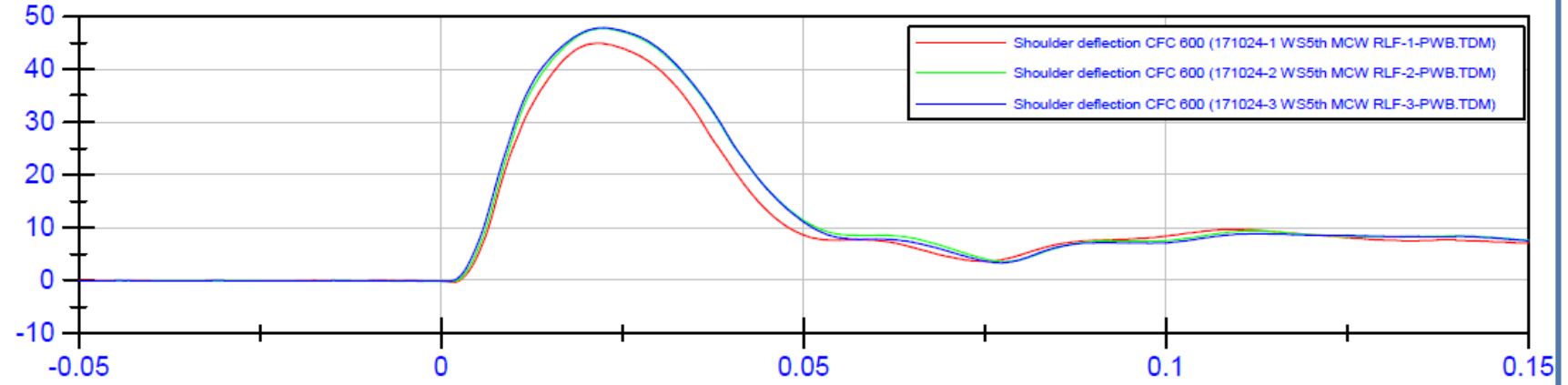
Dummy instrumentation  
SID-IIs 6.7 m/s rigid flat wall  
-shoulder  
-thorax rib 1  
-thorax rib 2



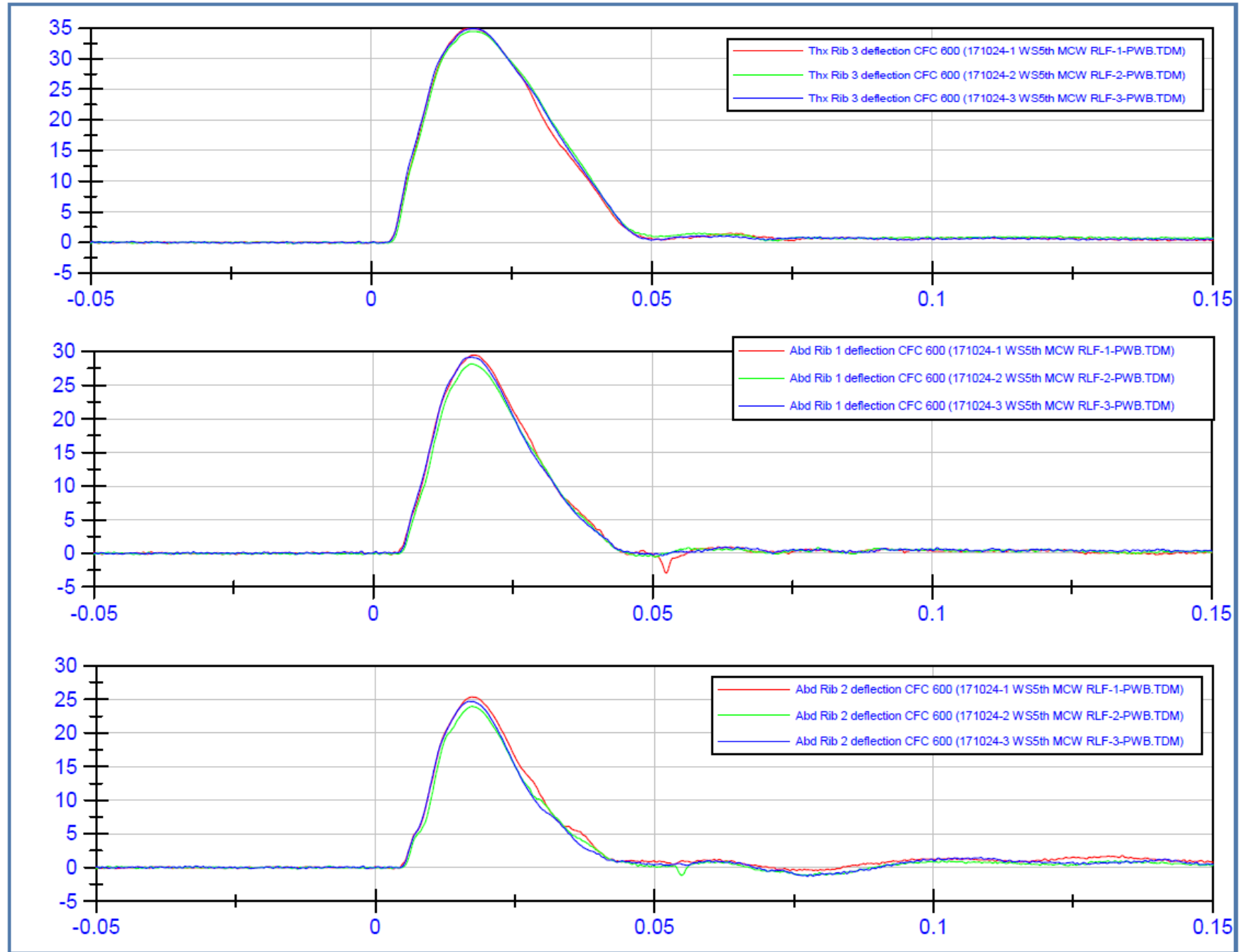
Dummy instrumentation  
SID-IIs 6.7 m/s rigid flat wall  
-thorax rib 3  
-abdomen rib 1  
-abdomen rib 2



Dummy instrumentation  
WS 5th 6.7 m/s rigid flat wall  
-shoulder  
-thorax rib 1  
-thorax rib 2

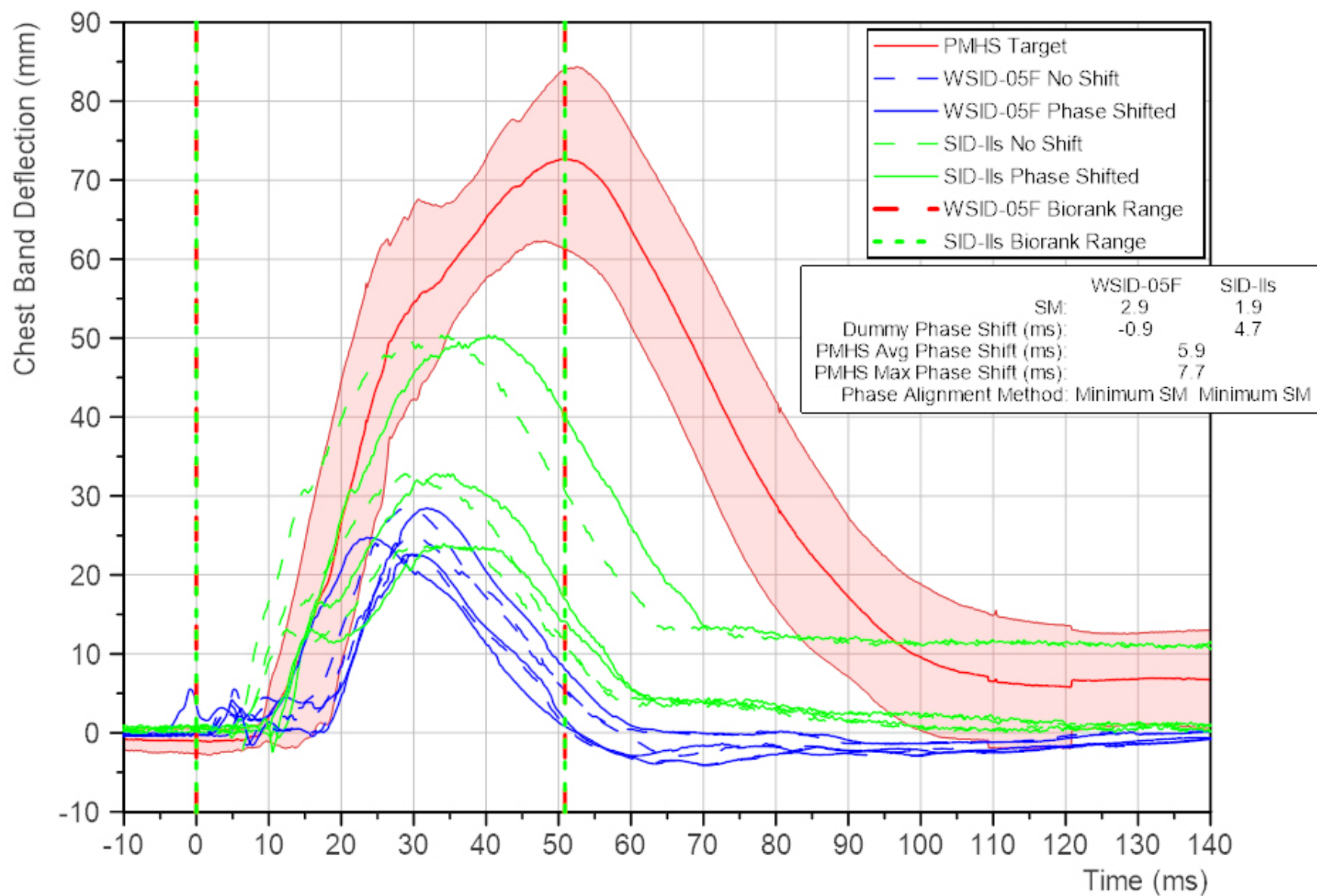


Dummy instrumentation  
WS 5th 6.7 m/s rigid flat wall  
-thorax rib 3  
-abdomen rib 1  
-abdomen rib 2



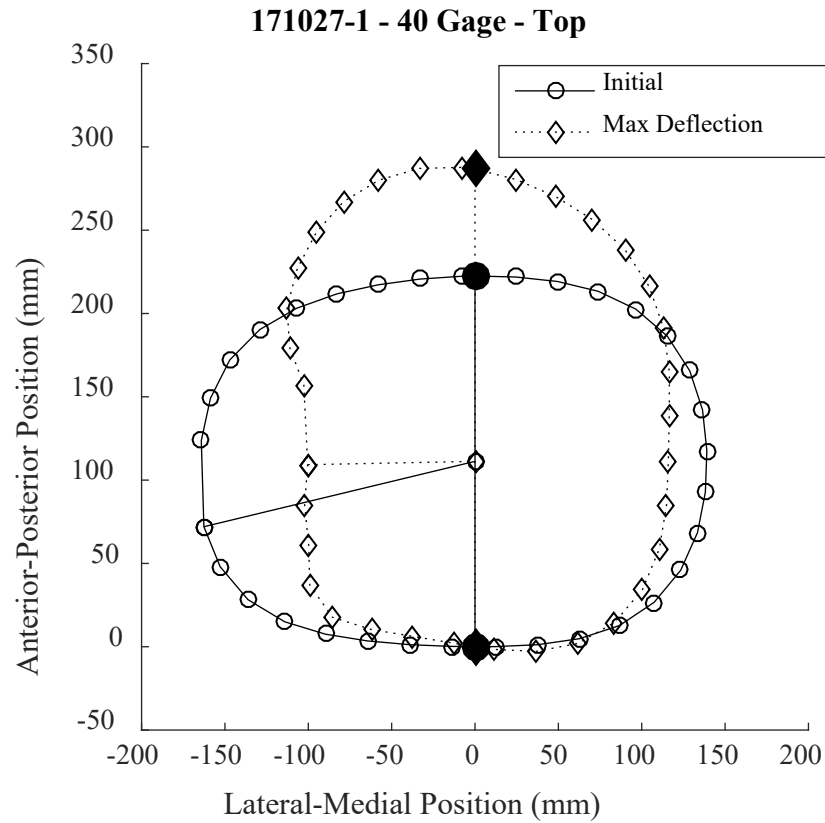
8.9 m/s Padded Flat Wall Sled  
Test

Padded High-Speed (8.9 m/s) Flat Wall Sled Test  
Upper Thorax Deflection (CFC1000)

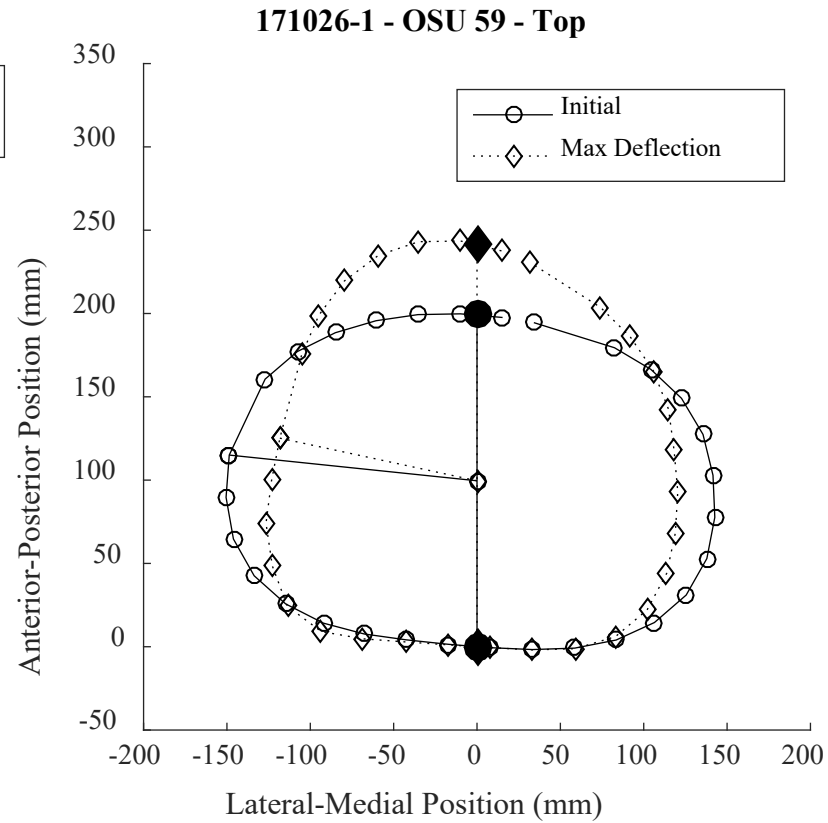




# 8.9 m/s Padded Flat Wall (MCW) Top Band, Test 1

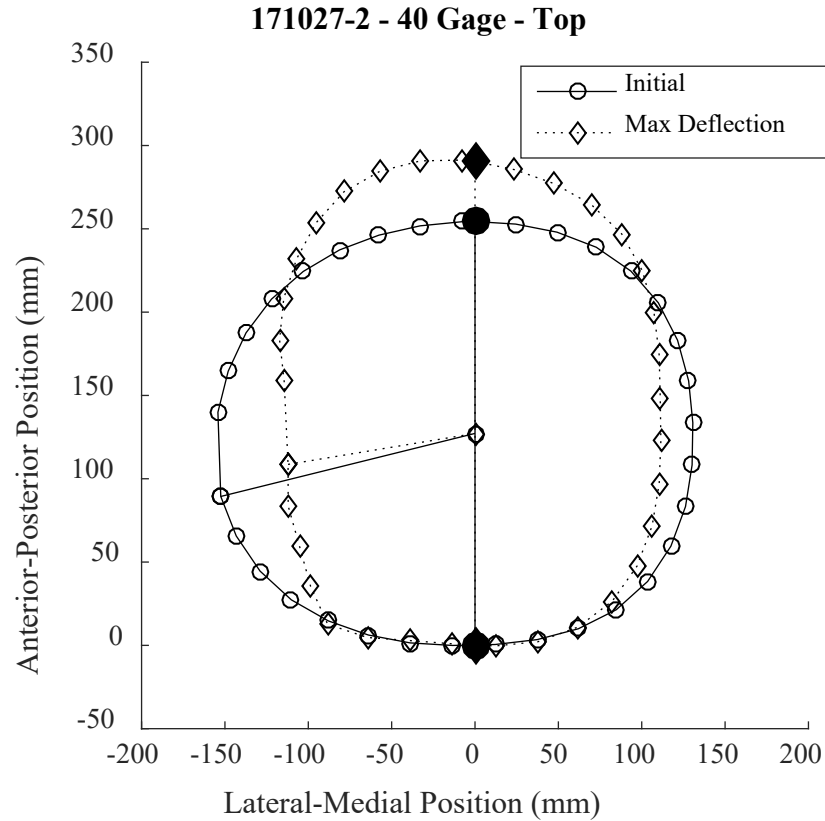


SID-IIs MCW PHF-1  
Max Deflection = 66.9 mm

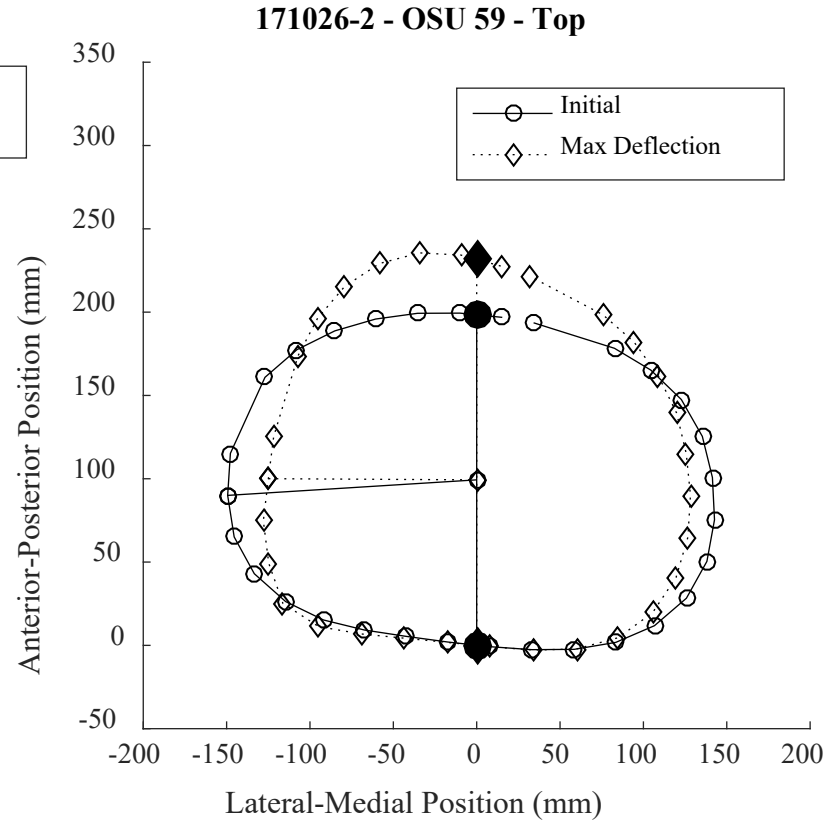


WS 5<sup>th</sup> MCW PHF-1  
Max Deflection = 28.4 mm

# 8.9 m/s Padded Flat Wall (MCW) Top Band, Test 2

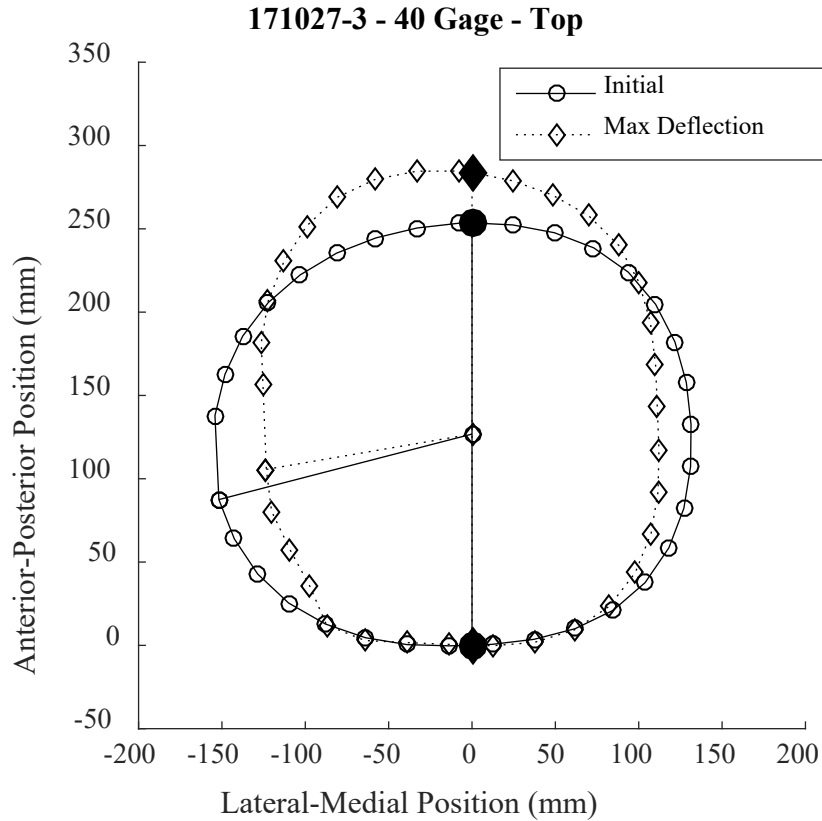


SID-IIs MCW PHF-2  
Max Deflection = 43.5 mm

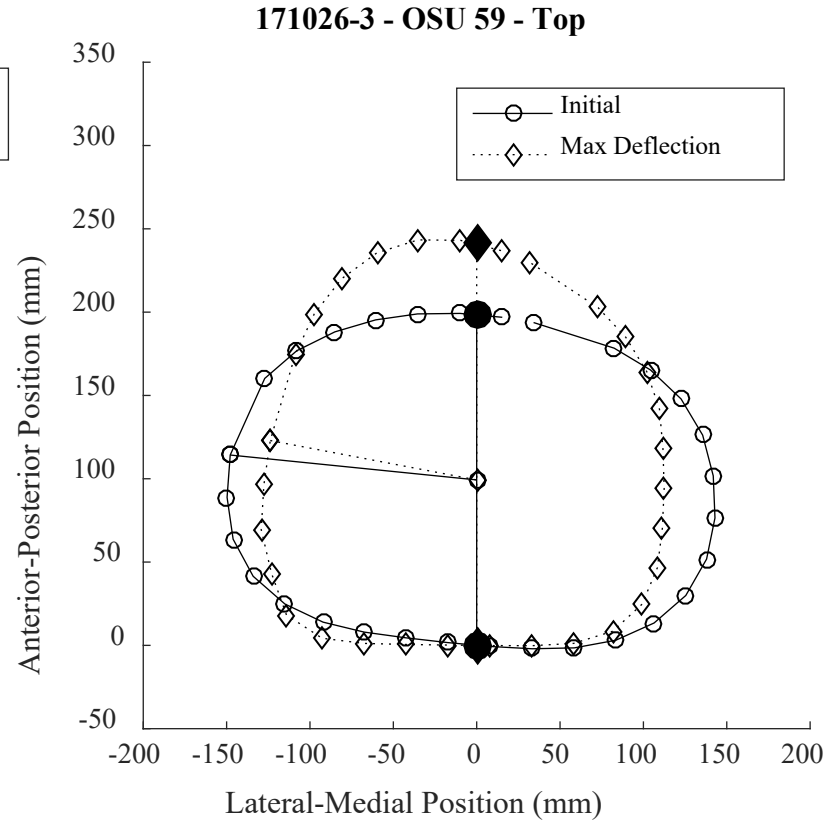


WS 5<sup>th</sup> MCW PHF-2  
Max Deflection = 24.7 mm

# 8.9 m/s Padded Flat Wall (MCW) Top Band, Test 3

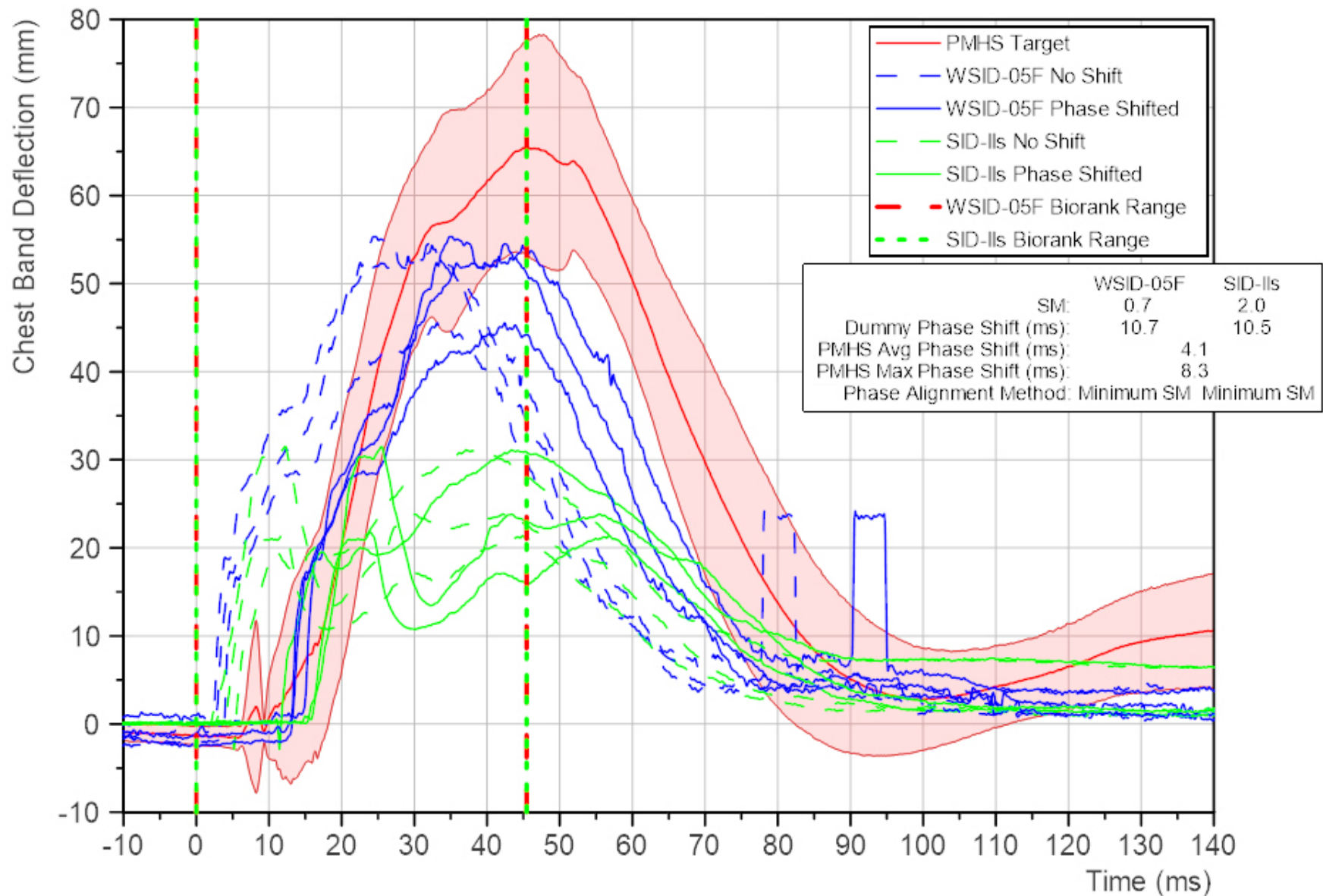


SID-IIs MCW PHF-3  
Max Deflection = 31.7 mm

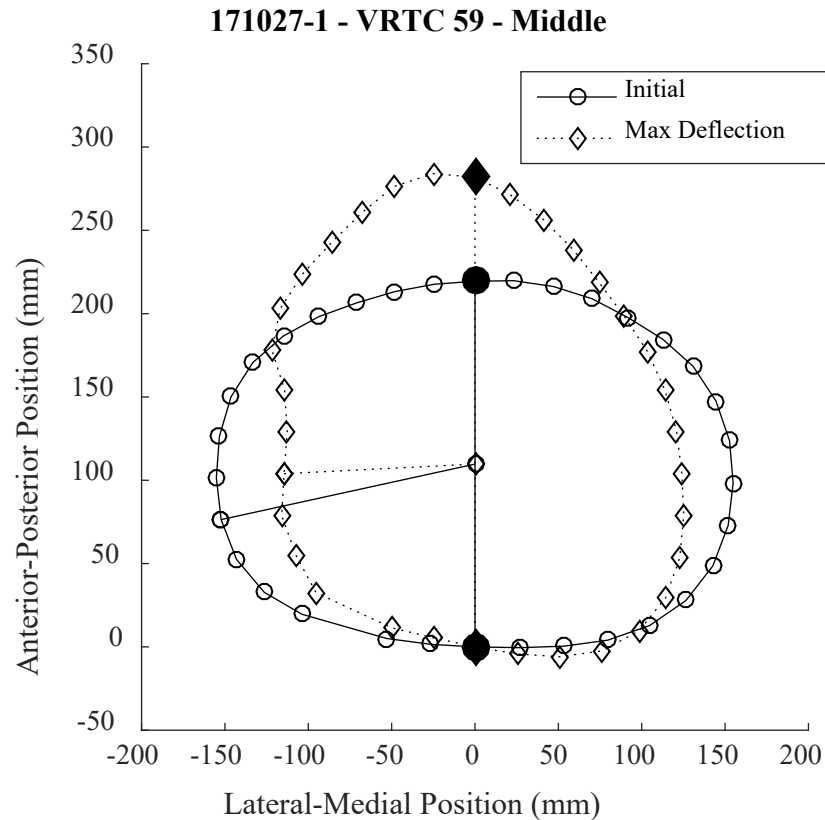


WS 5<sup>th</sup> MCW PHF-3  
Max Deflection = 22.5 mm

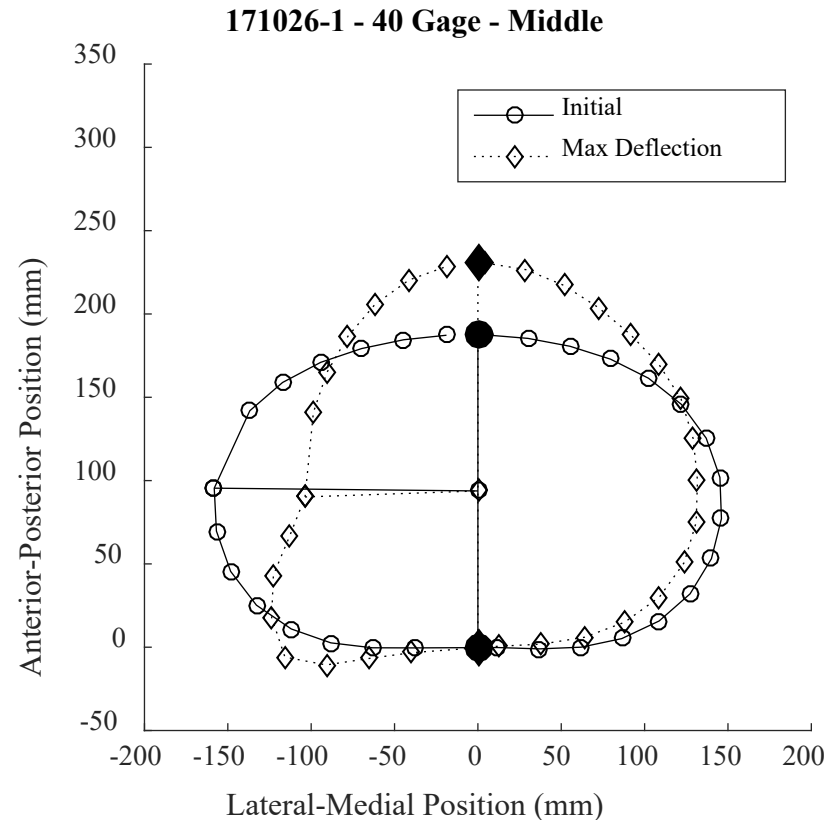
Padded High-Speed (8.9 m/s) Flat Wall Sled Test  
Lower Thorax Deflection (CFC1000)



# 8.9 m/s Padded Flat Wall (MCW) Middle Band, Test 1

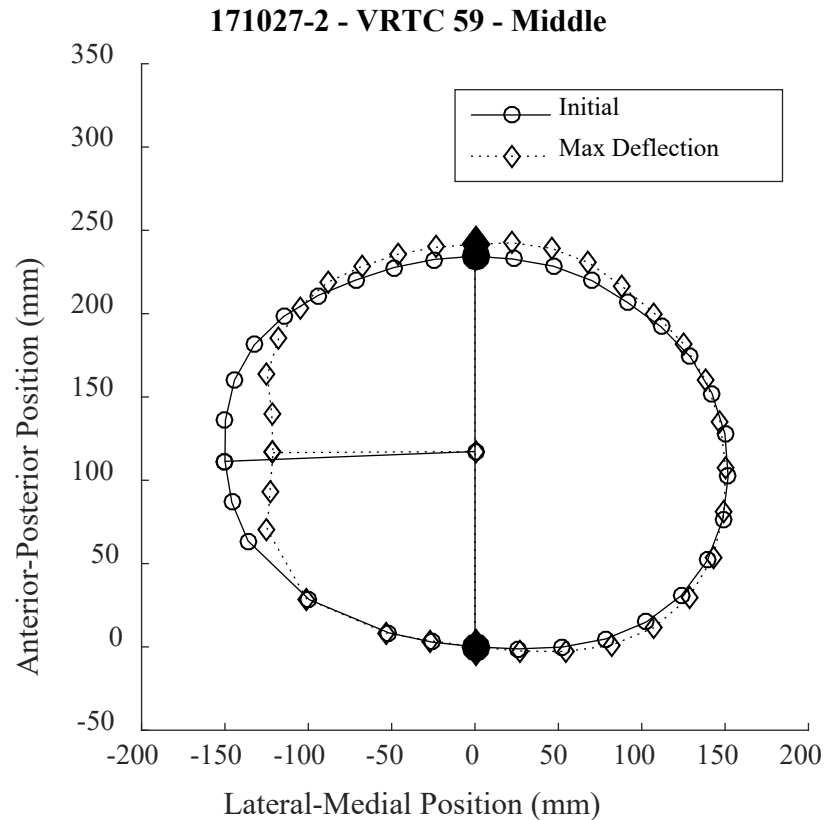


SID-IIs MCW PHF-1  
Max Deflection = 41.2 mm

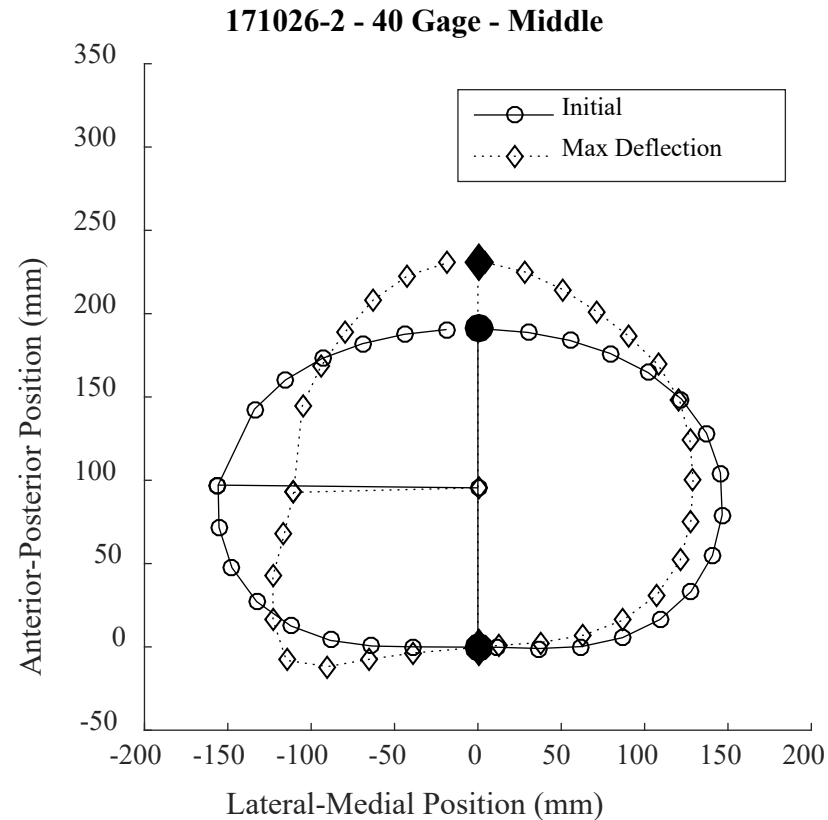


WS 5<sup>th</sup> MCW PHF-1  
Max Deflection = 54.4 mm

# 8.9 m/s Padded Flat Wall (MCW) Middle Band, Test 2

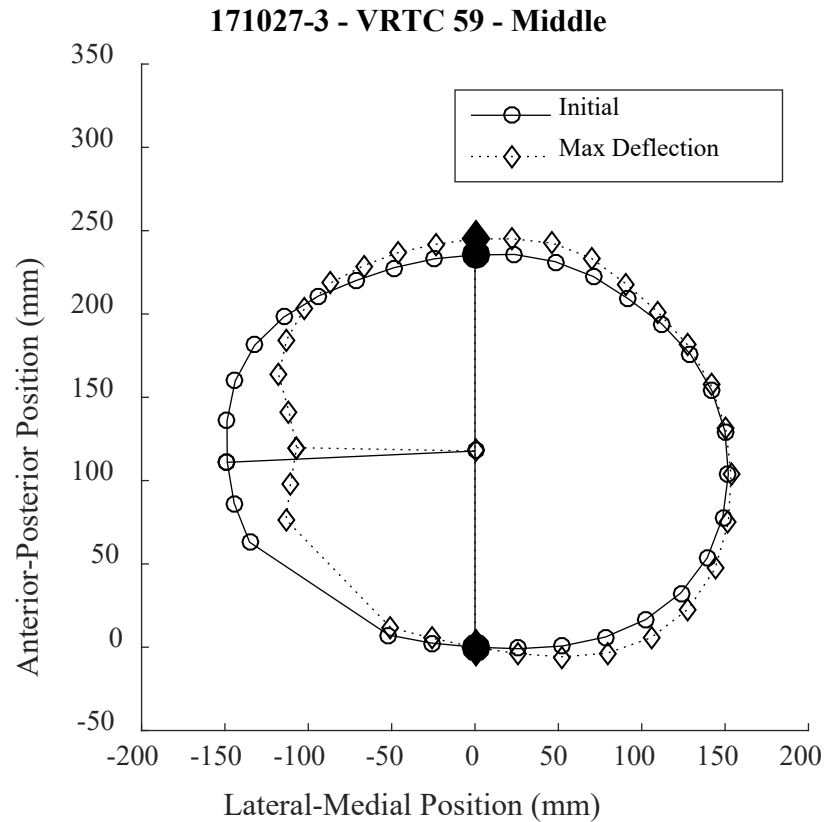


SID-IIs MCW PHF-2  
Max Deflection = 28.9 mm

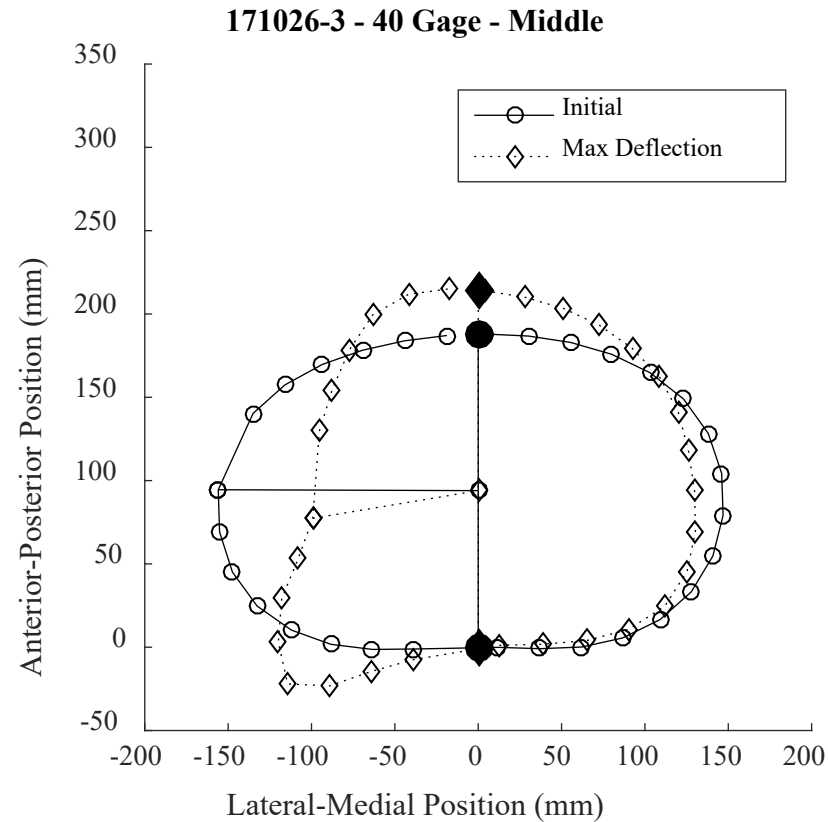


WS 5<sup>th</sup> MCW PHF-2  
Max Deflection = 45.3 mm

# 8.9 m/s Padded Flat Wall (MCW) Middle Band, Test 3

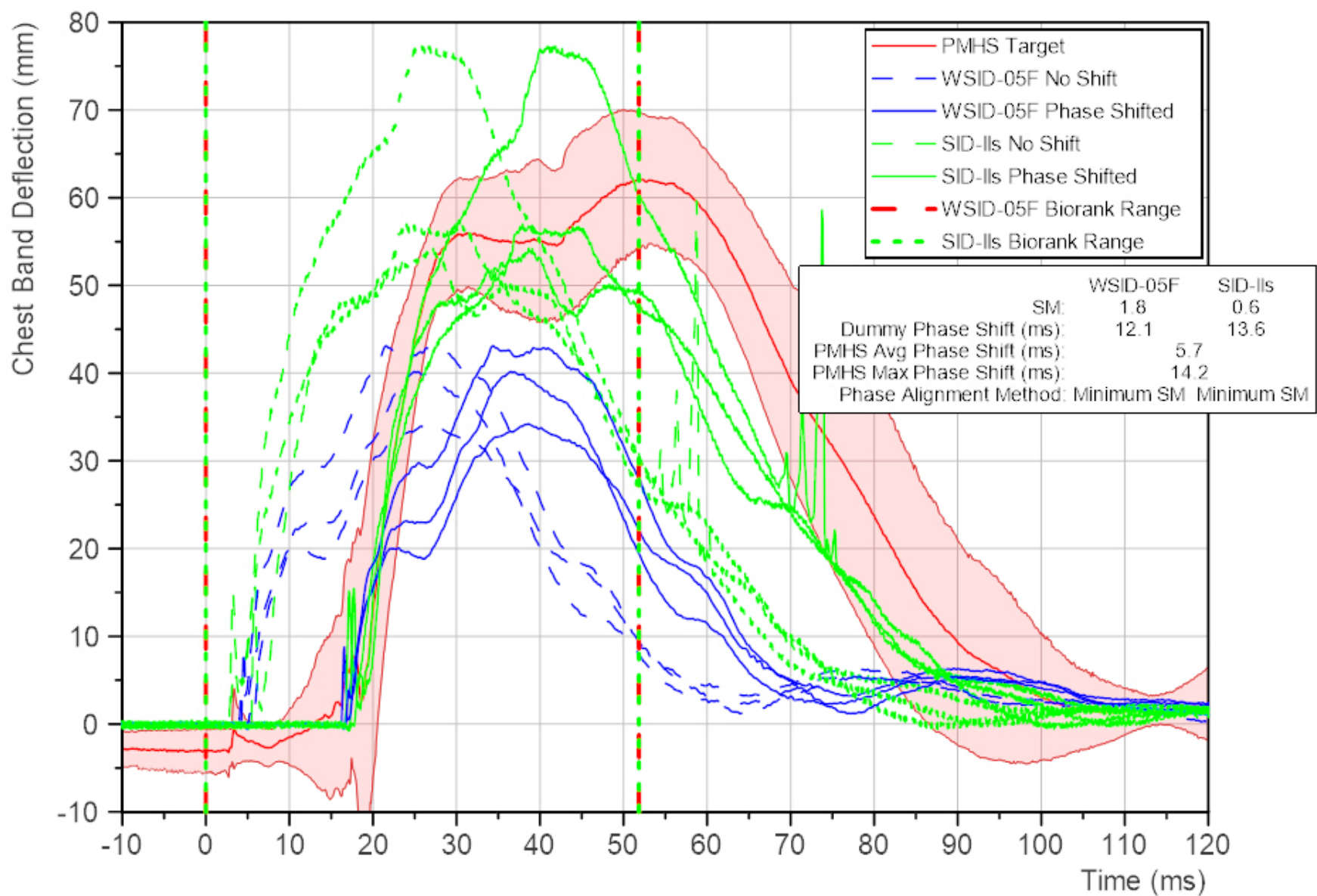


SID-IIs MCW PHF-3  
Max Deflection = 41.8 mm



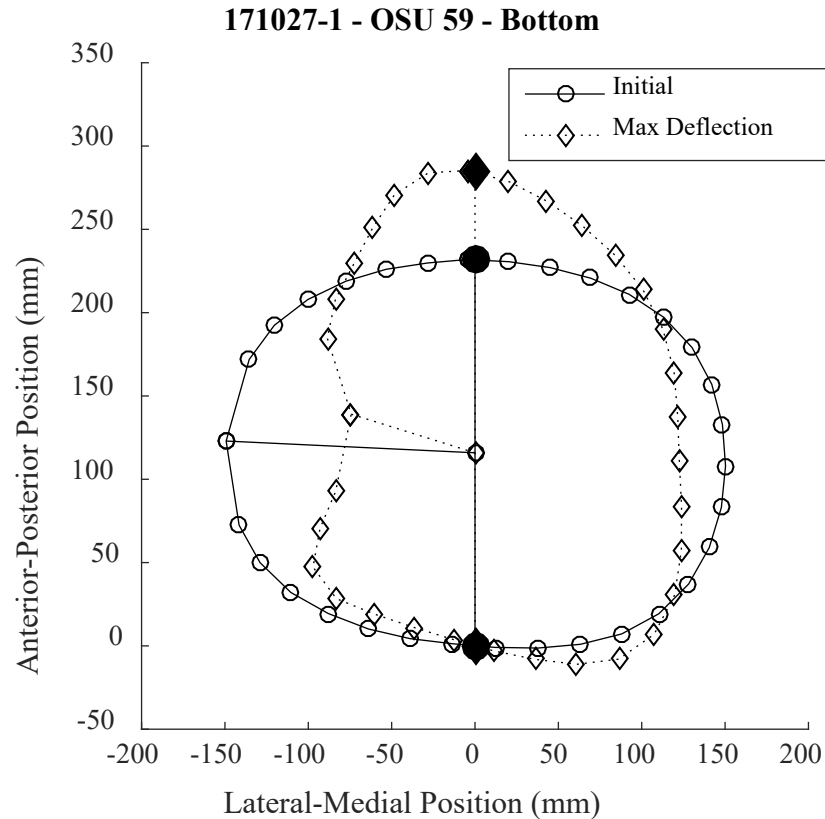
WS 5<sup>th</sup> MCW PHF-3  
Max Deflection = 55.3 mm

Padded High-Speed (8.9 m/s) Flat Wall Sled Test  
Abdomen Deflection (CFC1000)

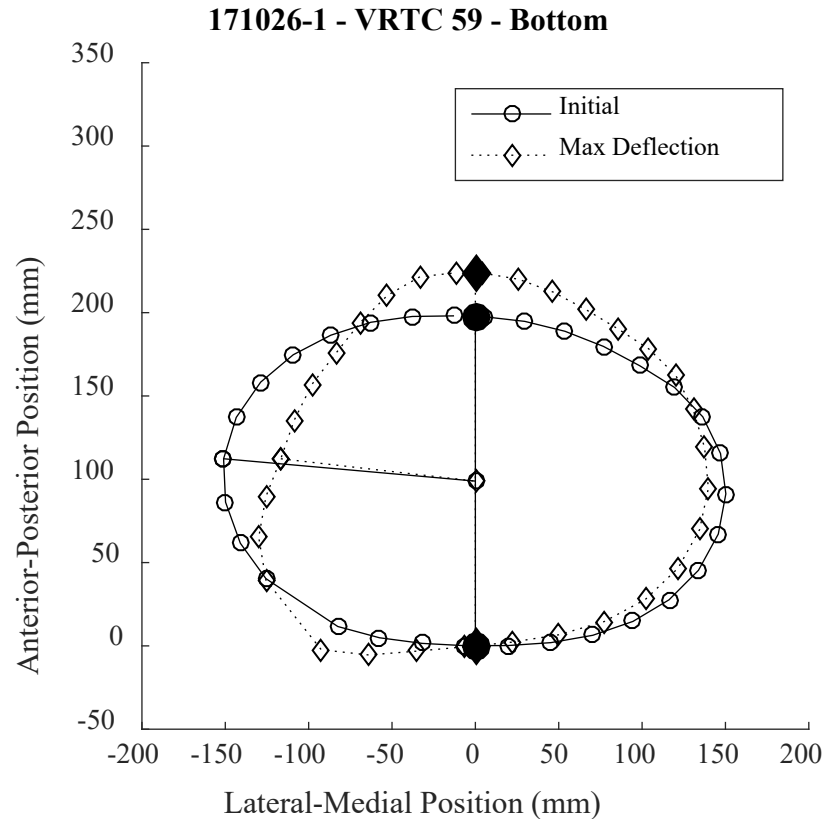




# 8.9 m/s Padded Flat Wall (MCW) Bottom Band, Test 1

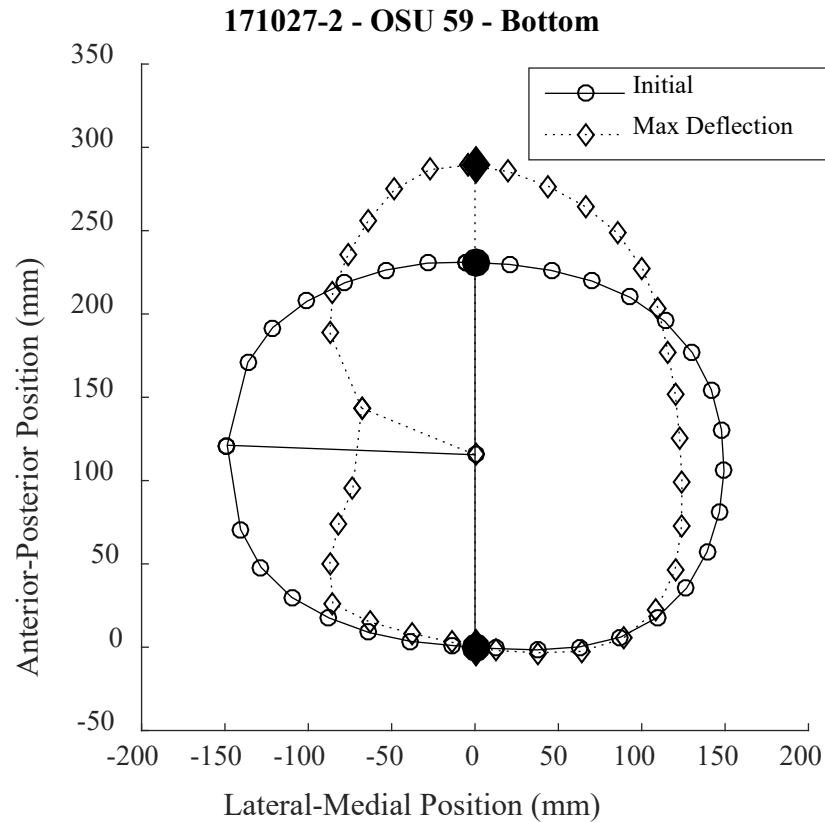


SID-IIs MCW PHF-1  
Max Deflection = 71.6 mm

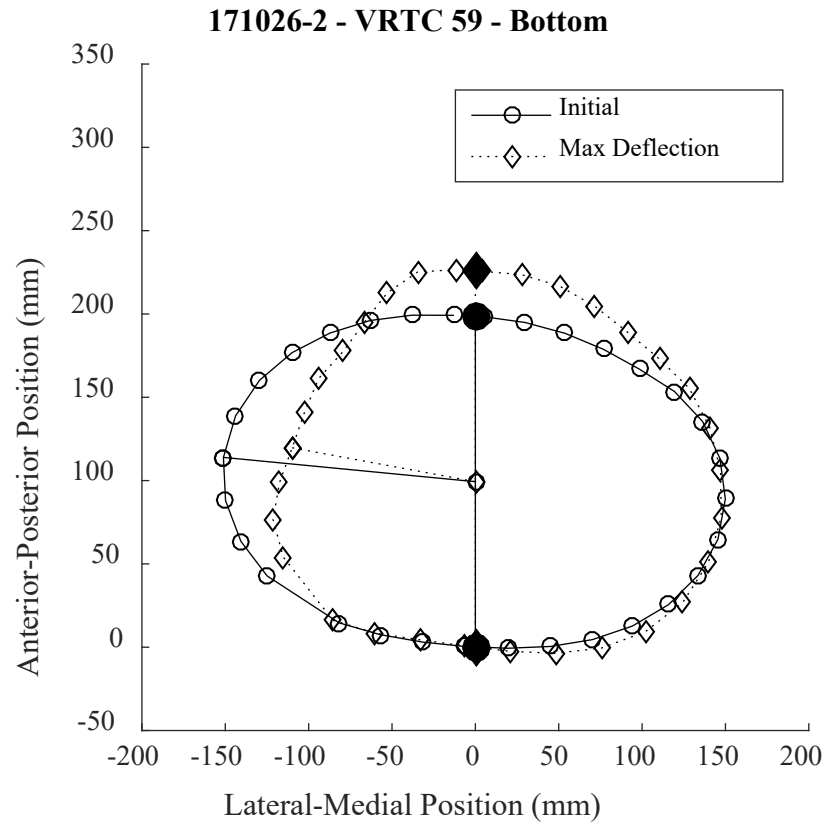


WS 5<sup>th</sup> MCW PHF-1  
Max Deflection = 34.2 mm

# 8.9 m/s Padded Flat Wall (MCW) Bottom Band, Test 2

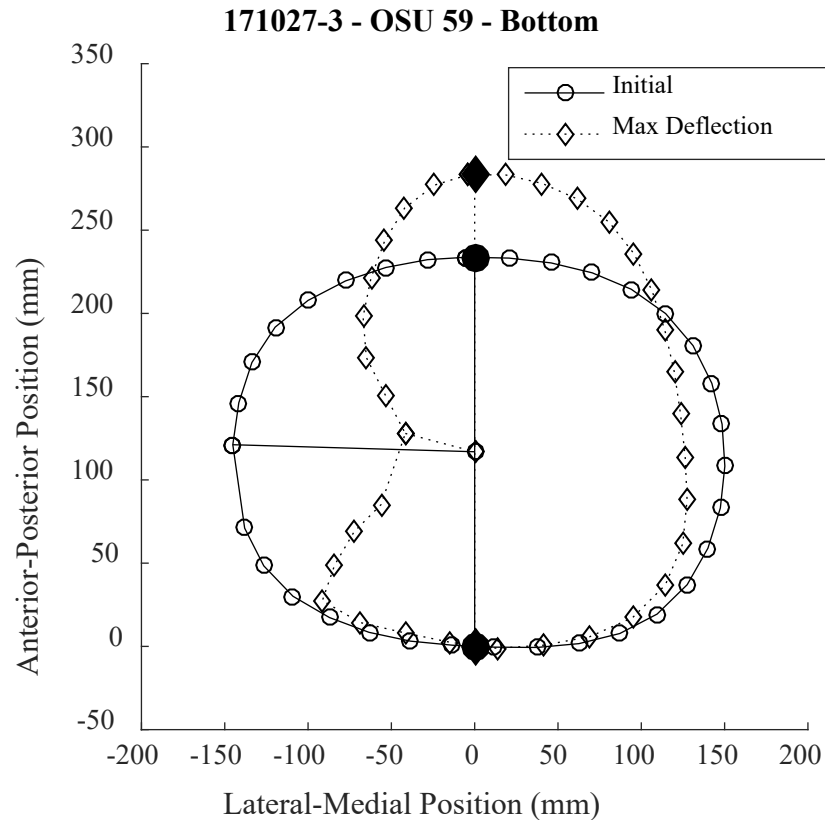


SID-IIs MCW PHF-2  
Max Deflection = 75.2 mm

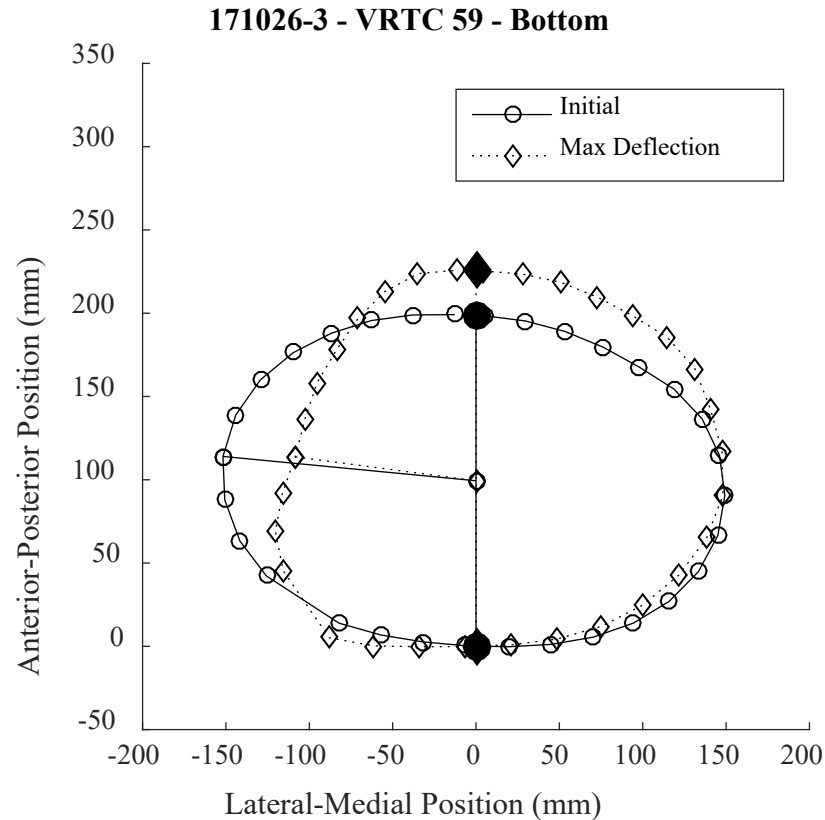


WS 5<sup>th</sup> MCW PHF-2  
Max Deflection = 40.1 mm

# 8.9 m/s Padded Flat Wall (MCW) Bottom Band, Test 3

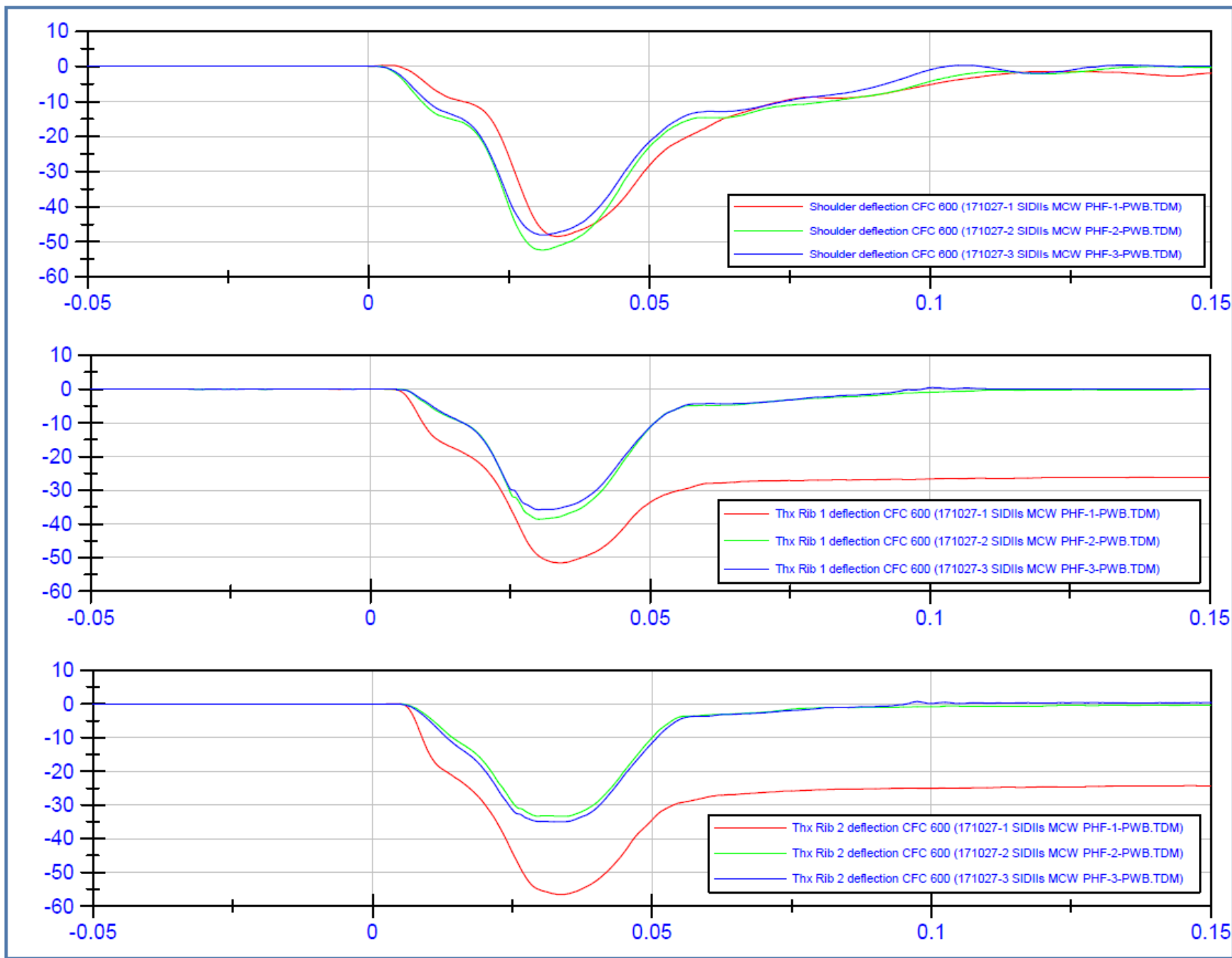


SID-IIs MCW PHF-3  
Max Deflection = 102.2 mm



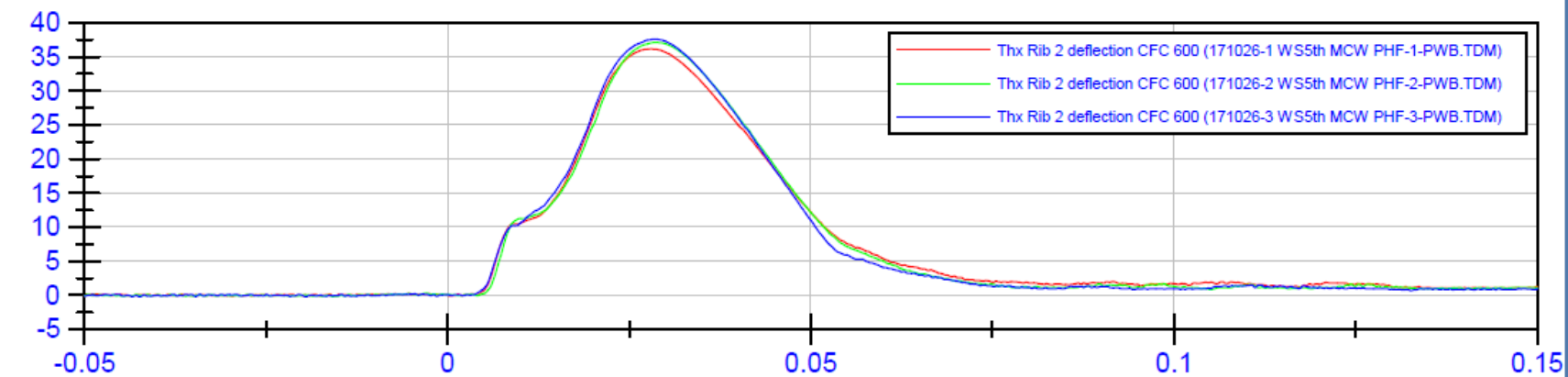
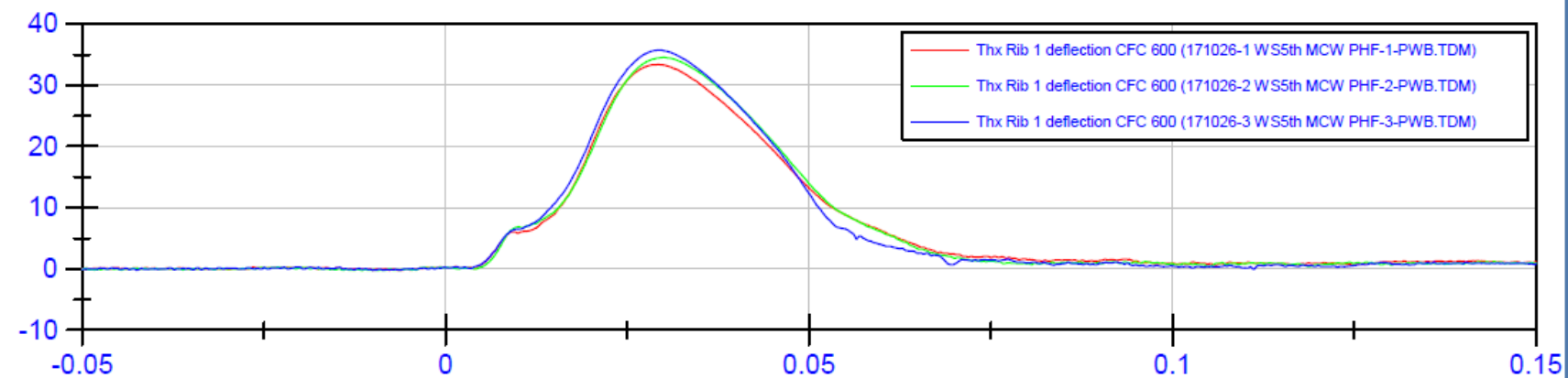
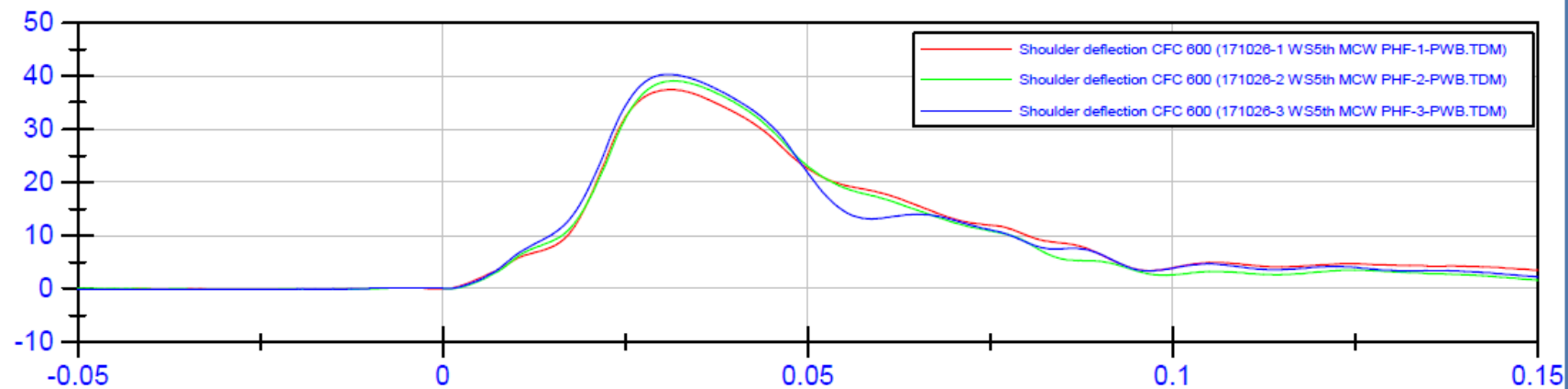
WS 5<sup>th</sup> MCW PHF-3  
Max Deflection = 43.2 mm

Dummy instrumentation  
SID-IIs 8.9 m/s padded flat wall  
-shoulder  
-thorax rib 1  
-thorax rib 2

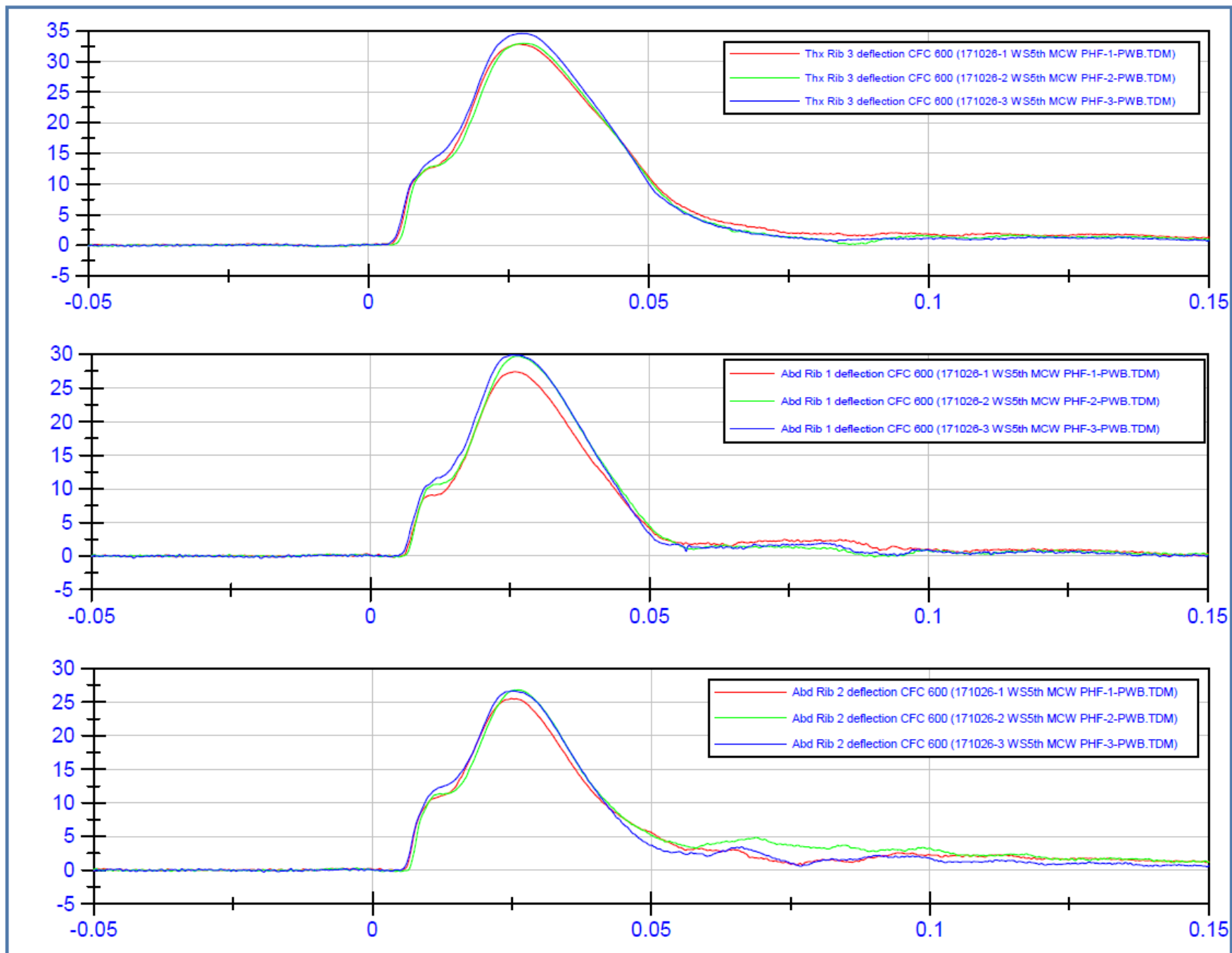




Dummy instrumentation  
WS 5th 8.9 m/s padded flat wall  
-shoulder  
-thorax rib 1  
-thorax rib 2



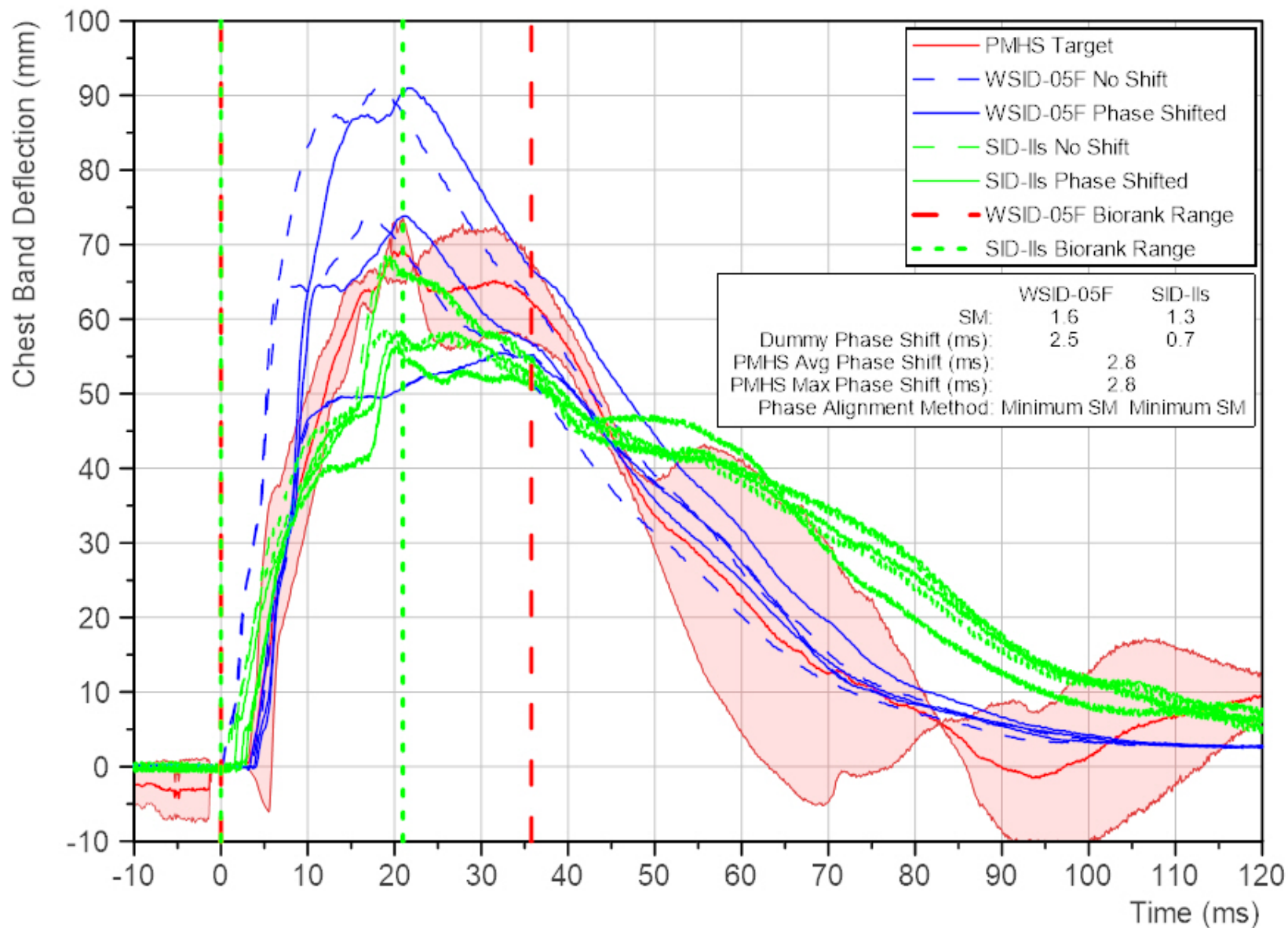
Dummy instrumentation  
WS 5th 8.9 m/s padded flat wall  
-thorax rib 3  
-abdomen rib 1  
-abdomen rib 2



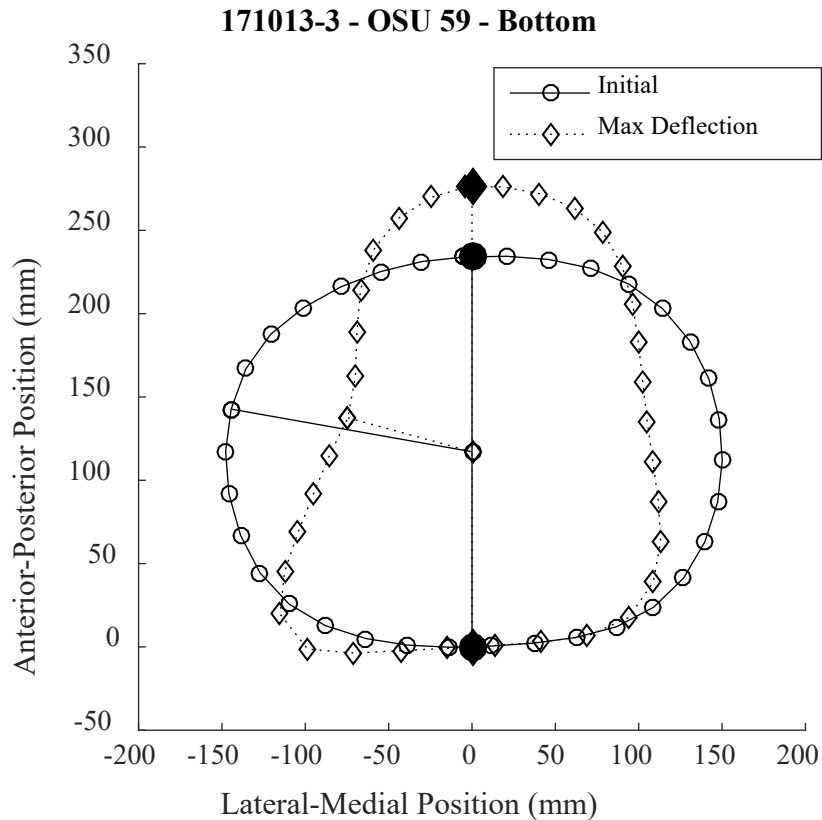
6.7 m/s Rigid Abdomen Offset  
Sled Test



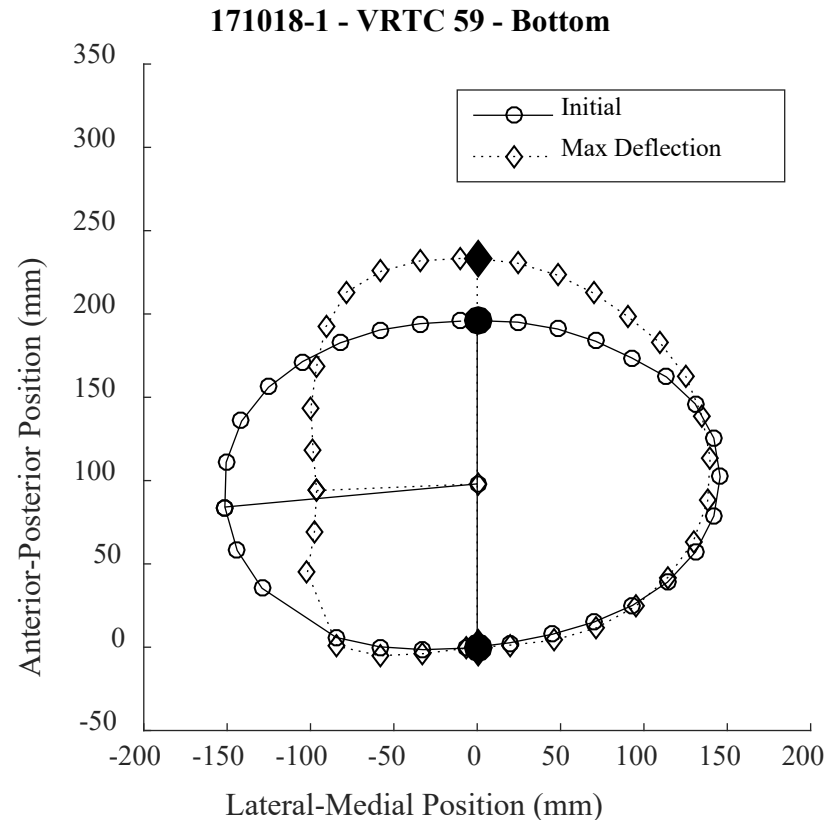
Rigid Low-Speed (6.7 m/s) Abdomen Sled Test  
Abdomen Deflection (CFC1000)



# 6.7 m/s Rigid Abdomen Offset (MCW) Bottom Band, Test 1

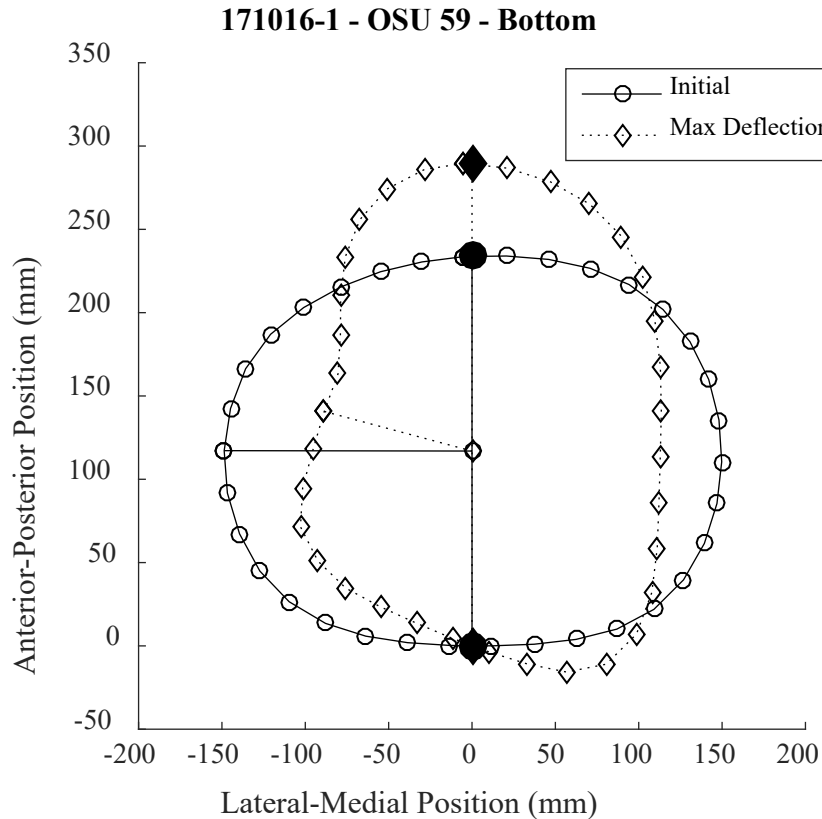


SID-IIs MCW RLA-1  
Max Deflection = 69.5 mm

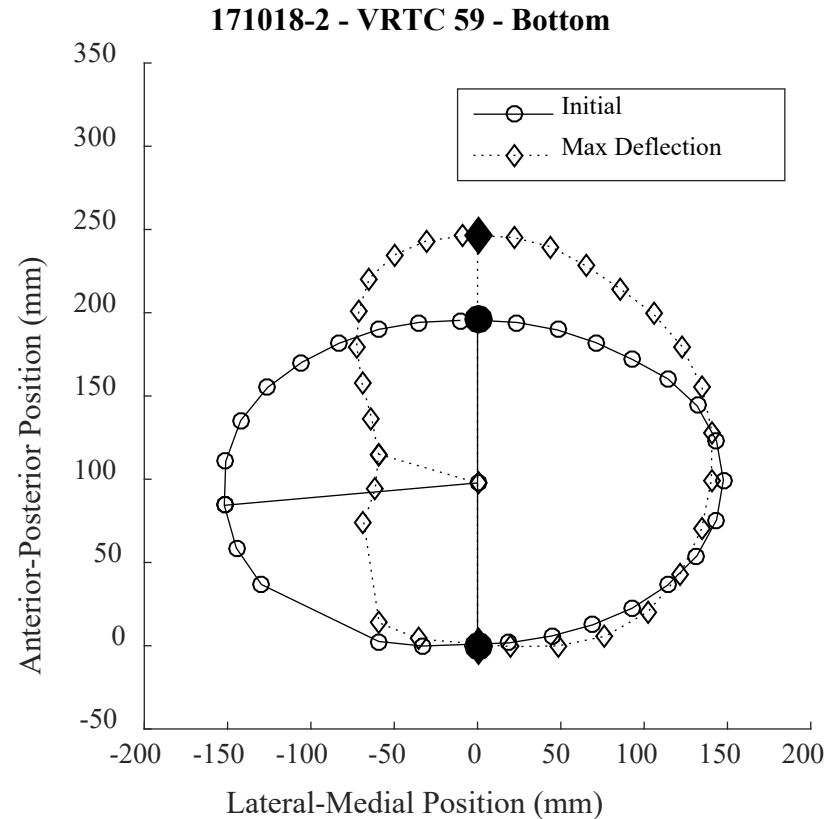


WS 5<sup>th</sup> MCW RLA-1  
Max Deflection = 55.6 mm

# 6.7 m/s Rigid Abdomen Offset (MCW) Bottom Band, Test 2

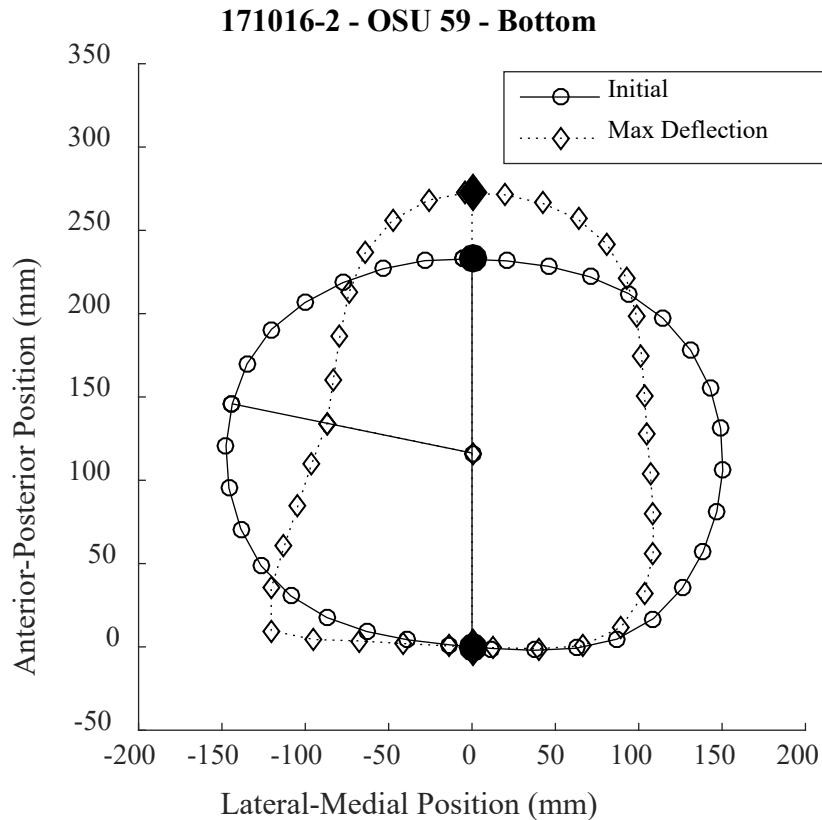


SID-IIs MCW RLA-2  
Max Deflection = 56.9 mm

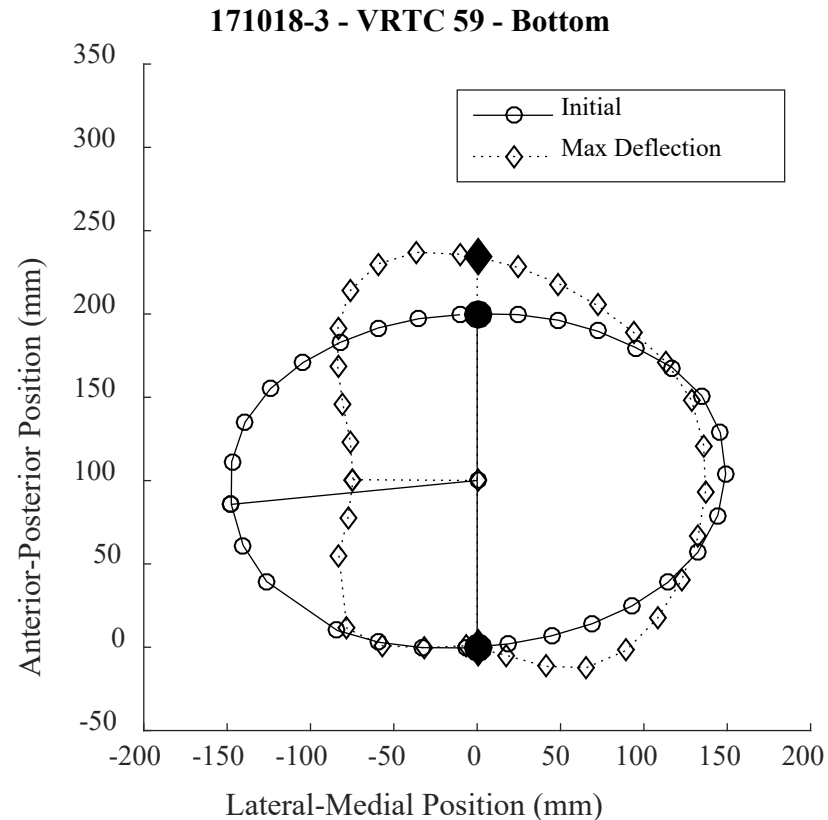


WS 5<sup>th</sup> MCW RLA-2  
Max Deflection = 90.7 mm

# 6.7 m/s Rigid Abdomen Offset (MCW) Bottom Band, Test 3

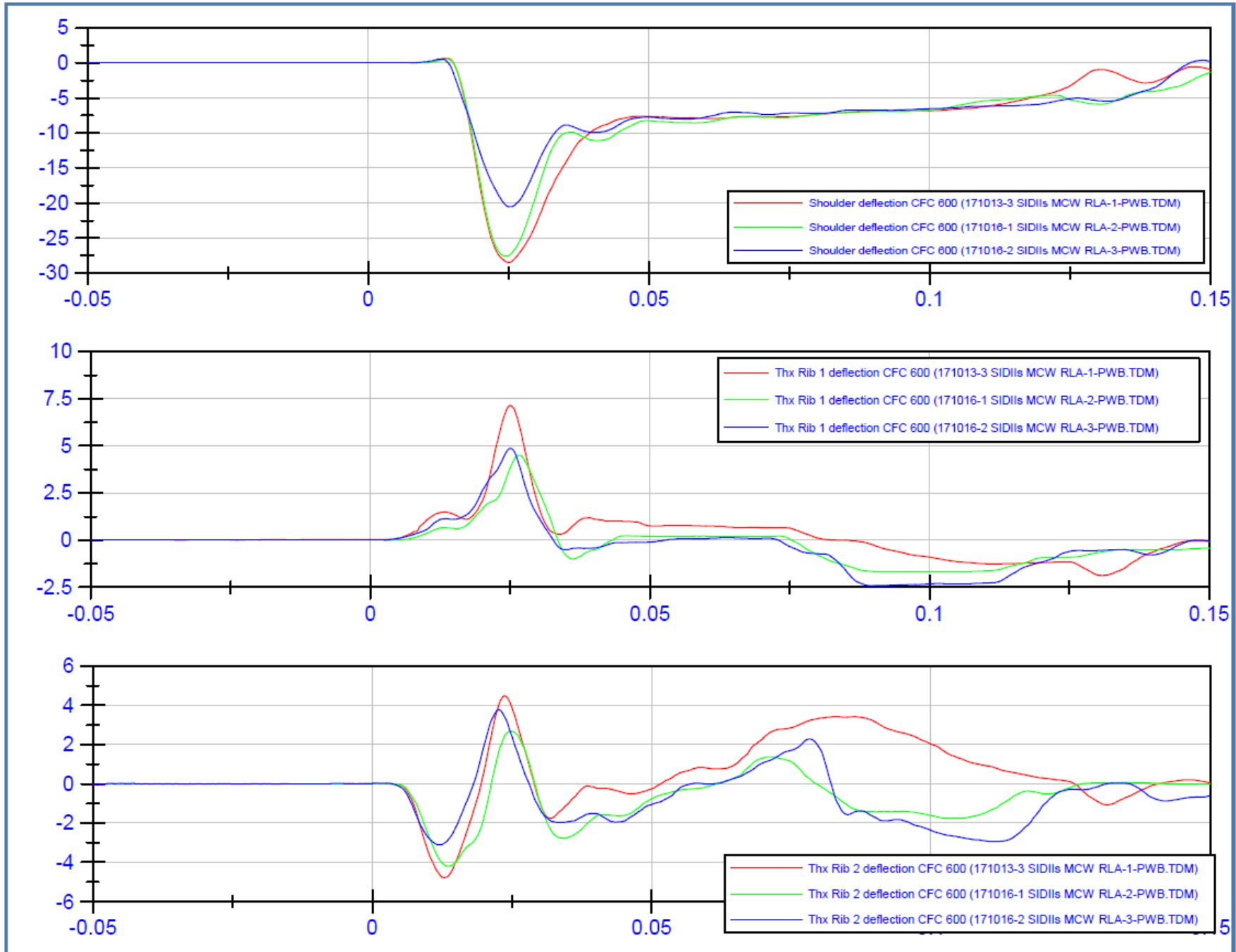


SID-IIs MCW RLA-3  
Max Deflection = 58.1 mm

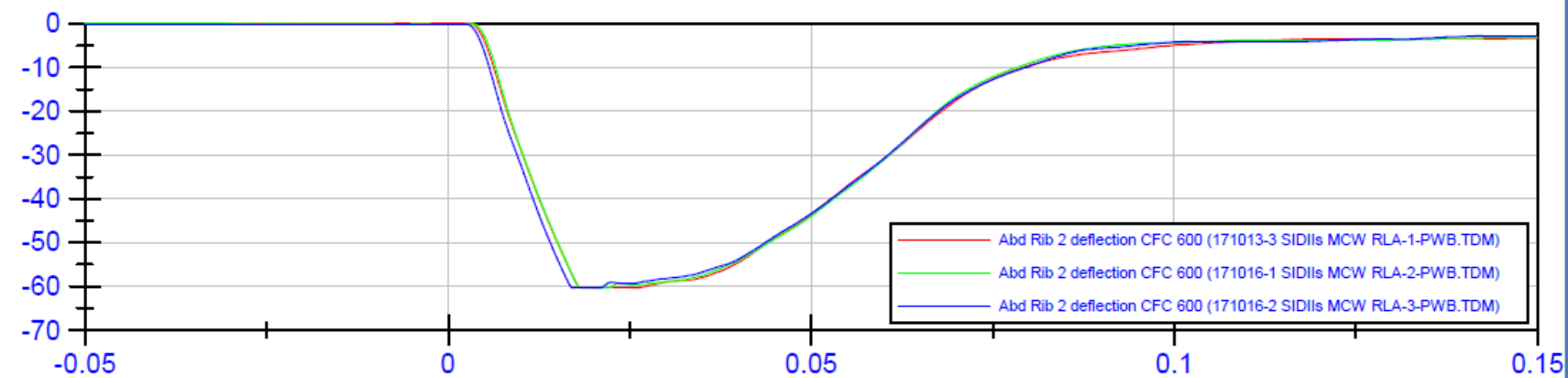
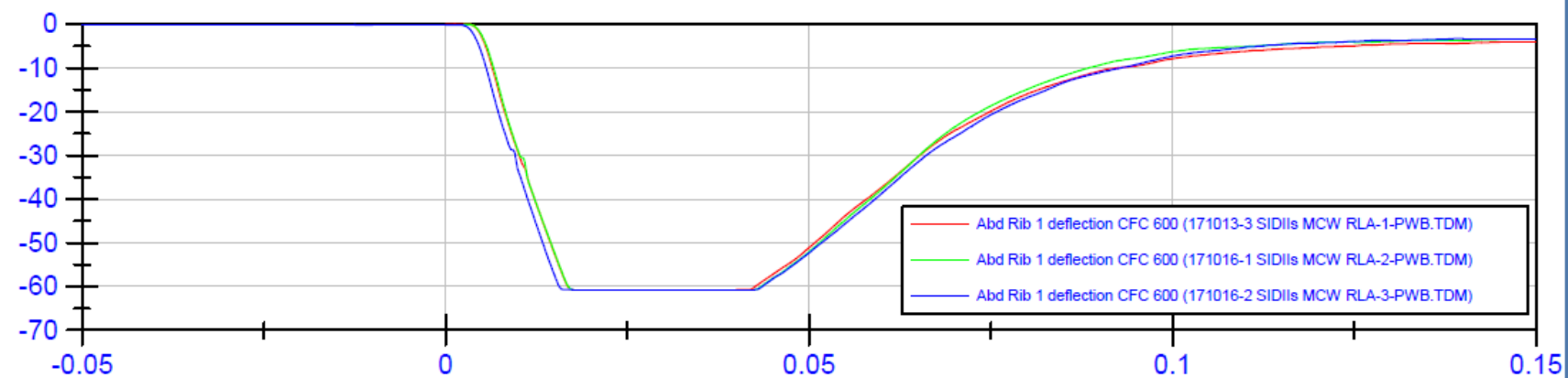
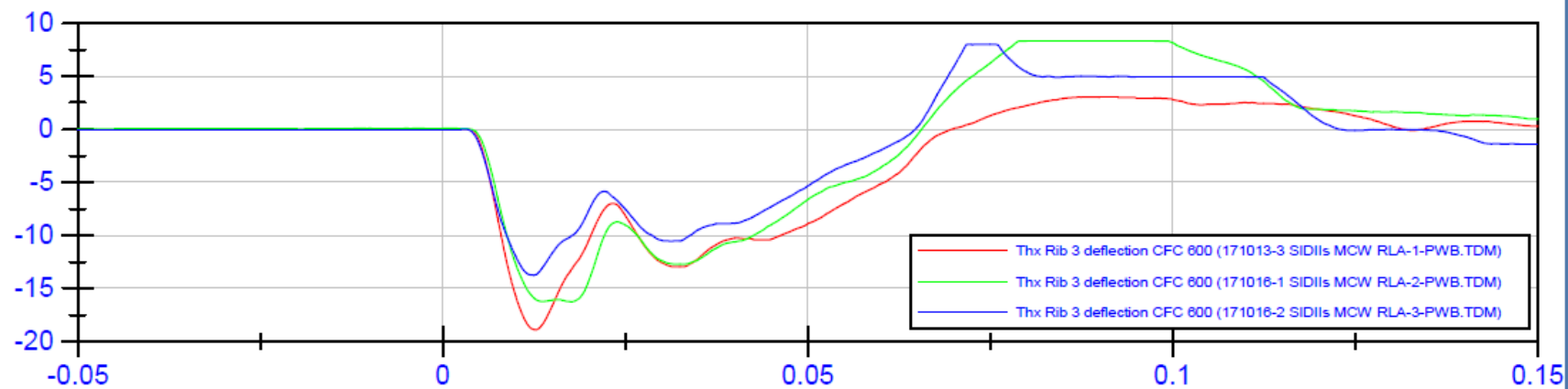


WS 5<sup>th</sup> MCW RLA-3  
Max Deflection = 73.8 mm

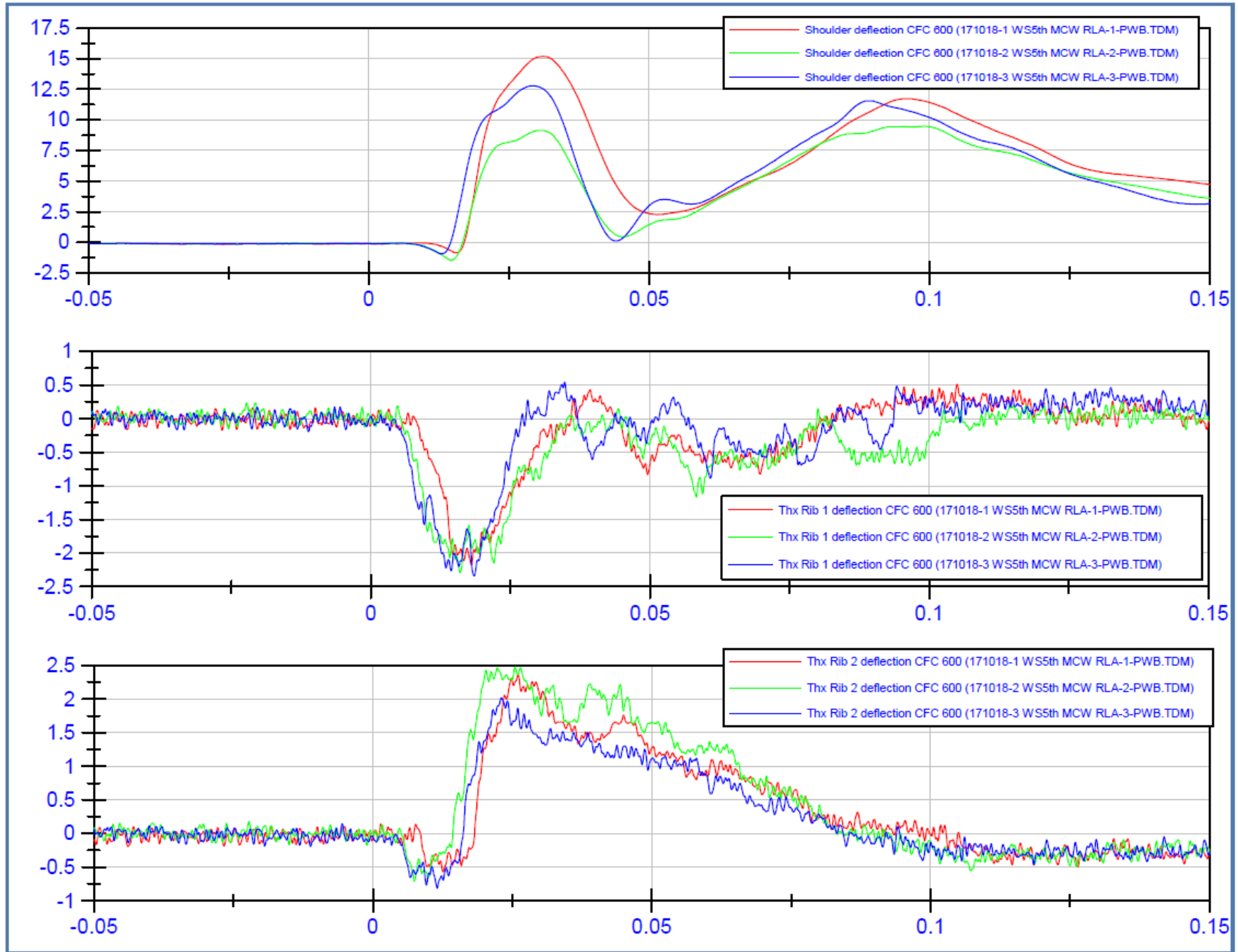
Dummy instrumentation  
SID-IIs 6.7 m/s rigid abdomen  
offset  
-shoulder  
-thorax rib 1  
-thorax rib 2



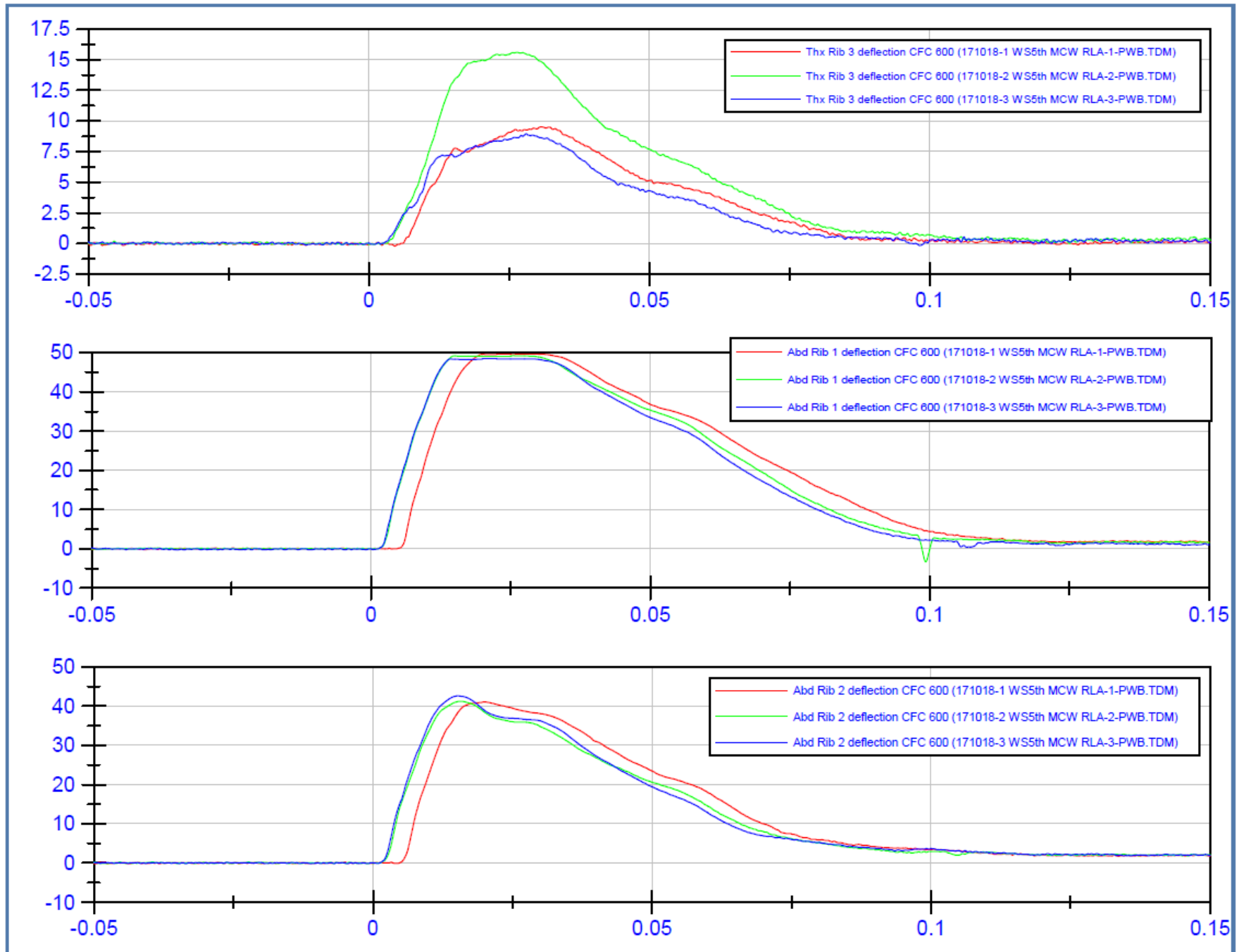
Dummy instrumentation  
SID-IIs 6.7 m/s rigid abdomen  
offset  
-thorax rib 3  
-abdomen rib 1  
-abdomen rib 2



Dummy instrumentation  
WS 5th 6.7 m/s rigid abdomen  
offset  
-shoulder  
-thorax rib 1  
-thorax rib 2



Dummy instrumentation  
WS 5th 6.7 m/s rigid abdomen  
offset  
-thorax rib 3  
-abdomen rib 1  
-abdomen rib 2





# Tests Used for Biofidelity Analyses

# ISO Tests Used to Evaluate Biofidelity by WS 5<sup>th</sup> TEG

Body Region	Test Name	Test Type	Response
Head	Head Test 1	200 mm Rigid Drop	Peak Resultant Accel. at a point on the non-impacted side of the head (g)
Neck	Neck Test 1	7.2 G Sled	Peak Lat. Accel. of T1 (g)
			Peak Lat. Displacement of T1 Relative to the Sled (mm)
			Peak Lat. Displacement of the Head CG Relative to T1 (mm)
			Peak Vertical Displacement of the Head CG Relative to T1 (mm)
			Time of Peak Head Excursion (s)
			Peak Lat. Accel. of the Head (g)
			Peak Vertical Accel. of the Head (g)
			Peak Flexion Angle (deg)
			Peak Flexion Angle (deg)
	Neck Test 2	6.7 G Sled	Peak Bending Moment Mx at OC (N-m)
			Peak Bending Moment My at OC (N-m)
			Peak Twist Moment Mz at OC (N-m)
			Peak Shear Force Fy at OC (N)
			Peak Tension Force Fz at OC (N)
			Peak Shear Force Fx at OC (N)
			Peak Resultant Head Accel. (g)
			Peak Lat. T1 Accel. (g)
	Neck Test 3	12.2 G Sled	Peak Lat. Head CG Accel. (g)
Peak Flexion Angle (deg)			
Pendulum Force (N)			
Shoulder	Shoulder Test 1	4.5 m/s Pendulum	Peak Lat. Shoulder Deflection (mm)
	Shoulder Test 2	7.2 G Sled	Peak Lat. Accel. of T1 (g)
			Peak Lat. Displacement of T1 Relative to the Sled (mm)
	Shoulder Test 3	12.2 G Sled	Peak Lat. Accel. of T1 (g)

Body Region	Test Name	Test Type	Response
Thorax	Thorax Test 1	4.3 m/s Pendulum	Pendulum Force FIR 100 (N)
	Thorax Test 2	6.0 m/s Pendulum	Lat. Accel. of T1 FIR 100 (g)
	Thorax Test 3	1 m Rigid Drop	Pendulum Force FIR 100 (N)
			Thorax Plate Force (N)
	Thorax Test 5	6.8 m/s Rigid Heidelberg Sled	Peak Deflection of Impacted Rib (mm)
			Thorax Plate Force FIR 100 (N)
			Peak Lat. Accel. of Upper Spine FIR 100 (g)
Abdomen	Abdomen Test 1	1 m Rigid Drop	Peak Lat. Accel. of Lower Spine FIR 100 (g)
			Peak Lat. Accel. of Impacted Rib (g)
			Peak Lat. Accel. of Impacted Rib FIR 100 (g)
	Abdomen Test 3	6.8 m/s Rigid WSU Sled	Armrest Force (N)
	Pelvis	Pelvis Test 1	6.0 m/s Pendulum
Peak Abdominal Penetration (mm)			
Pelvis Test 3		0.5 m Rigid Drop	Abdomen Plate Force (N)
Pelvis Test 4		1 m Rigid Drop	Peak Pendulum Force (N)
Pelvis Test 7		6.8 m/s Rigid Heidelberg Sled	Peak Pelvis Lat. Accel. (g)
			Peak Pelvis Lat. Accel. (g)
Pelvis Test 10	6.8 m/s Rigid WSU Sled	Peak Pelvic Plate Force FIR 100 (N)	
		Peak Pelvis Lat. Accel. FIR 100 (g)	
			Pelvic Plate Force (N)
			Peak Pelvis Lat. Accel. (g)

time history response corridor

# Thorax Body Region Tests Used for Biofidelity Evaluation by NHTSA

Body Region	Test Condition	Measurement	PMHS Avg	PMHS Max	WorldSID-05F		SID-IIs	
			Phase Shift (ms)	Phase Shift (ms)	SM	Phase Shift (ms)	SM	Phase Shift (ms)
Thorax	2.5 m/s Shaw Lateral Impact	Impactor Force	1.5	3.2	6.5	3.7	2.6	2.8
		Chest Band Deflection	2.4	4.9	1.3	8.2	5.1	7.7
		Test Condition Avg.			3.9		3.9	
	2.5 m/s Shaw Oblique Impact	Impactor Force	3.5	7.0	5.8	13.7	2.0	5.8
		Chest Band Deflection	3.4	6.7	3.0	4.5	1.7	4.3
		Test Condition Avg.			4.4		1.8	
	4.5 m/s Rhule Lateral Impact	Impactor Force	1.9	3.1	5.8	8.3	3.4	5.7
		Chest Band Deflection	1.7	2.1	0.7	8.4	0.7	9.1
		Test Condition Avg.			3.3		2.1	
	4.5 m/s Rhule Oblique Impact	Impactor Force	1.7	3.3	5.7	3.6	3.0	2.5
		Chest Band Deflection	1.9	3.8	4.2	5.0	1.3	5.4
		Test Condition Avg.			4.9		2.1	
	6.7 m/s Rigid-Wall Sled Test	Thorax Plate Force	3.1	6.3	3.3	14.2	3.1	5.1
		Upper Thorax Deflection	2.2	4.3	3.0	4.0	1.2	7.9
		Lower Thorax Deflection	2.3	4.3	0.7	11.1	0.3	9.4
		T1 Y-axis Acceleration	2.8	5.9	1.2	11.8	1.9	4.1
		T12 Y-axis Acceleration	1.9	2.3	1.6	7.3	1.4	1.0
		Test Condition Avg.			2.0		1.6	
	6.7 m/s Padded-Wall Sled Test	Thorax Plate Force	4.7	9.2	1.2	13.8	0.9	10.7
		Upper Thorax Deflection	4.6	6.9	2.6	4.1	2.0	15.8
		Lower Thorax Deflection	5.4	10.6	1.2	14.6	1.4	12.5
		T1 Y-axis Acceleration	6.4	9.7	0.9	4.0	0.9	8.5
		T12 Y-axis Acceleration	4.3	8.3	0.9	9.1	1.2	2.7
		Test Condition Avg.			1.4		1.3	
	8.9 m/s Padded-Wall Sled Test	Thorax Plate Force	3.1	6.0	1.7	12.8	0.5	4.1
		Upper Thorax Deflection	5.9	7.7	2.9	-0.9	1.9	4.7
		Lower Thorax Deflection	4.1	8.3	0.7	10.7	2.0	10.5
		T1 Y-axis Acceleration	3.6	7.5	0.3	6.4	0.4	3.2
		T12 Y-axis Acceleration	2.0	3.5	1.0	9.6	0.7	2.1
		Test Condition Avg.			1.3		1.1	
Thorax Avg.				3.0		2.0		

**SM = BRS score**