

WorldSID-50M

RibEye Crash Test Report

2020 Hyundai Veloster MDB Test

February 11, 2021

This document supplements the data presented in the Test Report. In the Test Report, the RibEye channels shown were up-sampled from 10 kHz as recorded by the RibEye system to 20 kHz to match the sampling rate of the rest of the data collected. When error codes appear in the data, the up-sampling caused anomalous overshoot as seen in the plots in Appendix B of the Test Report. This supplementary document includes new plots of the RibEye data sampled at 10 kHz as recorded, in which no overshoot occurs. In addition, a separate time channel for the 10 kHz sampling rate has been added to the EV5 file for RibEye.

Error Code and Maximum Length Change Summary

Rib	LED	Error Code	Start Time (ms)	End Time (ms)	Maximum Length Change (mm)	Time of Maximum Length Change (ms)	Comments
Shoulder	Rear	None	N/A	N/A	18.6	48	
	Middle	None	N/A	N/A	21.7	46.6	
	Front	None	N/A	N/A	11.9	45.2	
Thorax 1	Rear	None	N/A	N/A	14.5	37.7	
	Middle	None	N/A	N/A	16.7	29.4	
	Front	None	N/A	N/A	14.1	27.4	
Thorax 2	Rear	None	N/A	N/A	18.9	39.4	
	Middle	None	N/A	N/A	18.7	40.6	
	Front	None	N/A	N/A	9.9	30.2	
Thorax 3	Rear	None	N/A	N/A	16.8	32.8	
	Middle	None	N/A	N/A	17.2	31.9	
	Front	None	N/A	N/A	7.9	28.7	
Abdomen 1	Rear	None	N/A	N/A	16.5	33.7	
	Middle	None	N/A	N/A	18.2	31.7	
	Front	None	N/A	N/A	10.0	31.5	
Abdomen 2	Rear	None	N/A	N/A	17.5	33.3	
	Middle	None	N/A	N/A	22.0	31.8	
	Front	None	N/A	N/A	13.6	33.2	

Maximum Shoulder Length Change

Maximum Thorax Length Change

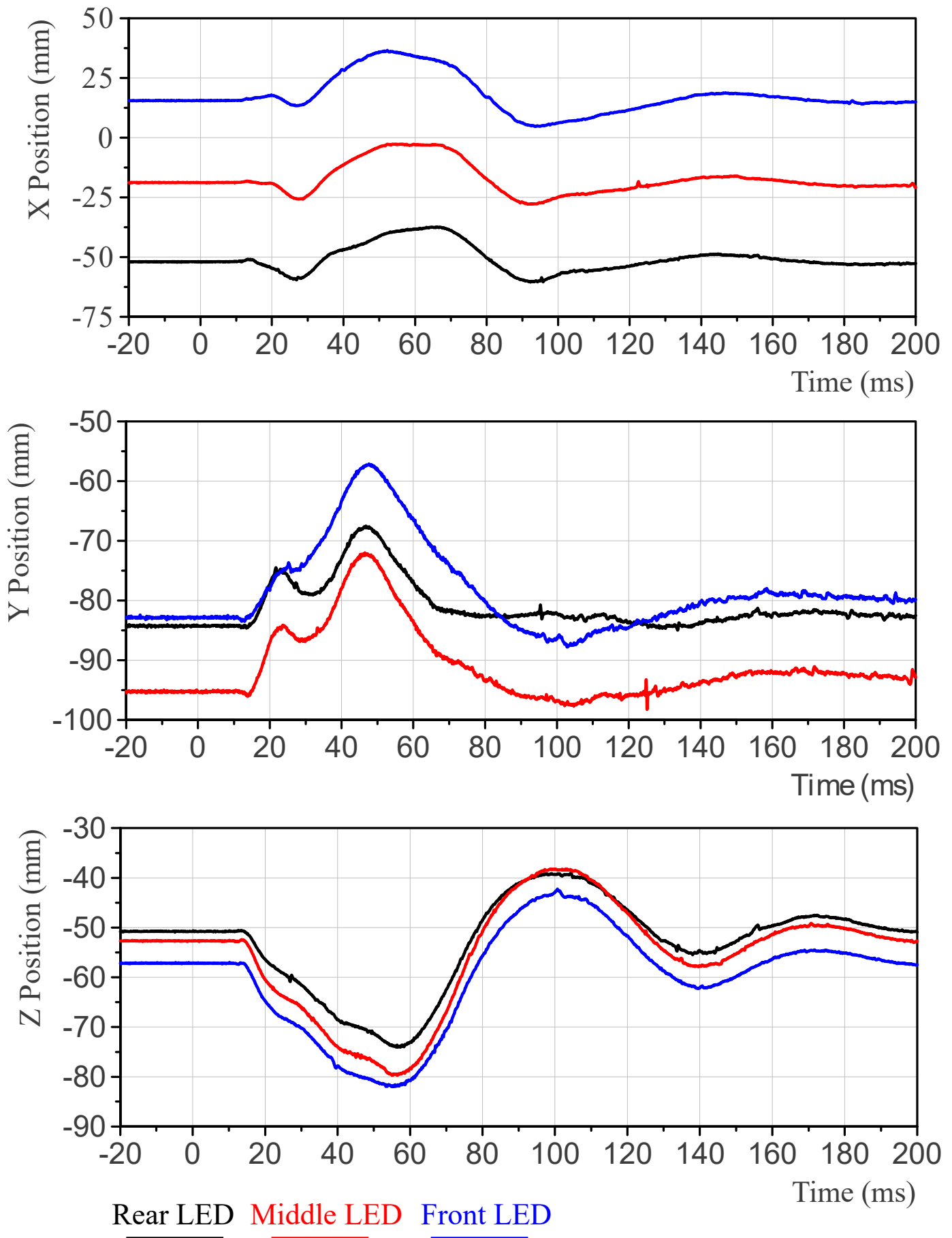
Maximum Abdomen Length Change

Error Code	Error Code Description
1	Top Sensor Blocked
2	Bottom Sensor Blocked
3	Top and Bottom Sensor Blocked
4	Middle Sensor Blocked
5	Middle and Top Sensor Blocked
6	Middle and Bottom Sensor Blocked
7	All Tree Sensors Blocked
8	Divide-By -Zero Condition
9	LED Moved Out of Calibration Range

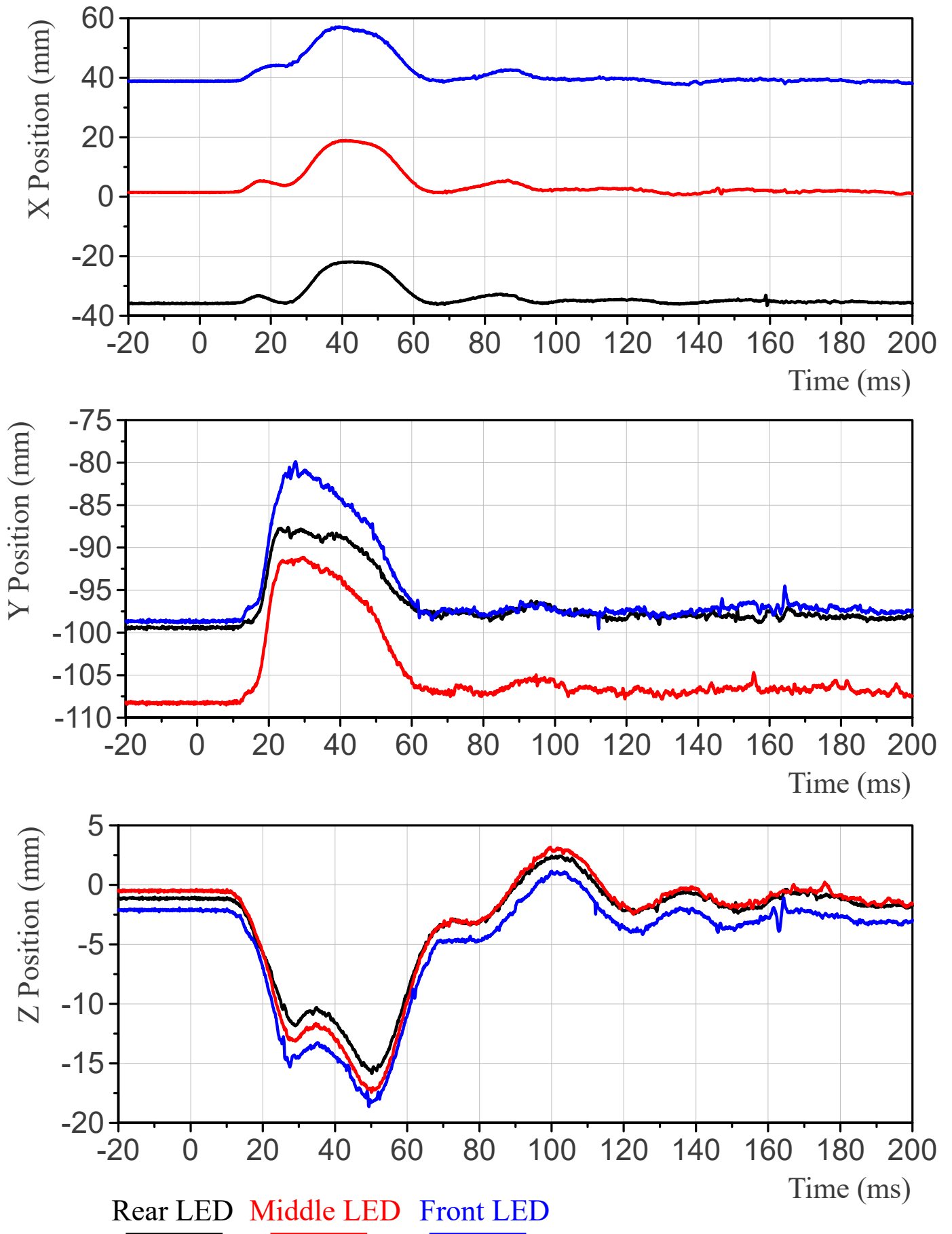
LED Initial Positions

LED	x-axis	y-axis	z-axis
Shoulder Rear	-52	-84.3	-50.8
Shoulder Middle	-18.9	-95.2	-52.7
Shoulder Front	15.5	-82.8	-57.2
Thorax 1 Rear	-35.9	-99.4	-1.1
Thorax 1 Middle	1.4	-108.3	-0.5
Thorax 1 Front	38.8	-98.7	-2.1
Thorax 2 Rear	-28.7	-99.3	40.8
Thorax 2 Middle	7	-110	41.8
Thorax 2 Front	43.3	-102.3	46.2
Thorax 3 Rear	-48.6	-94	-34.9
Thorax 3 Middle	-17.6	-101.5	-33.2
Thorax 3 Front	13.6	-92.4	-34.6
Abdomen 1 Rear	-31.7	-95.7	-1.9
Abdomen 1 Middle	2.5	-104.1	-1.7
Abdomen 1 Front	34.6	-95.9	-3.3
Abdomen 2 Rear	-11.7	-93.1	31.6
Abdomen 2 Middle	19.8	-103.4	29.8
Abdomen 2 Front	50.1	-95.5	32

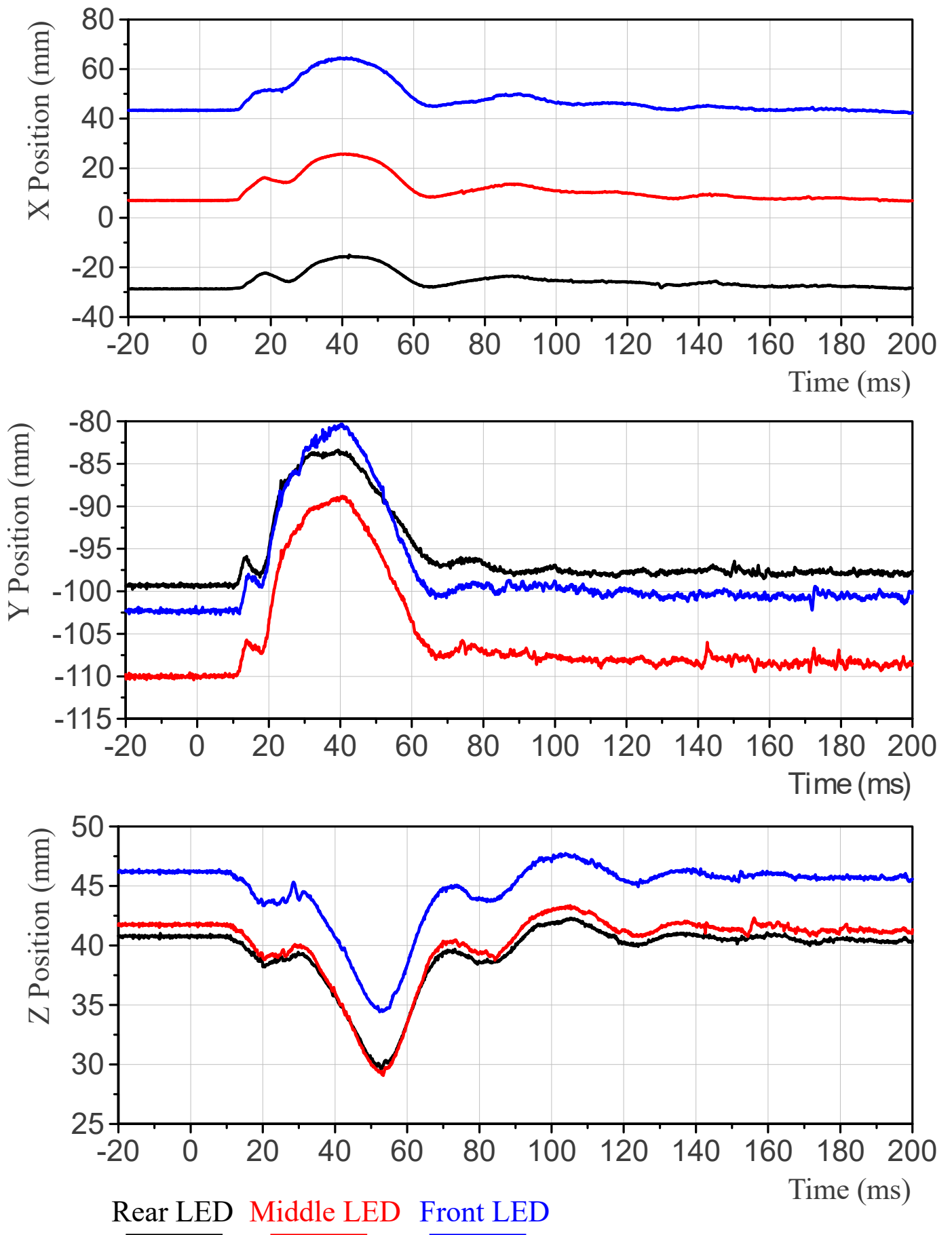
Shoulder Rib Absolute Position, Relative to Thorax Rib 1 Origin



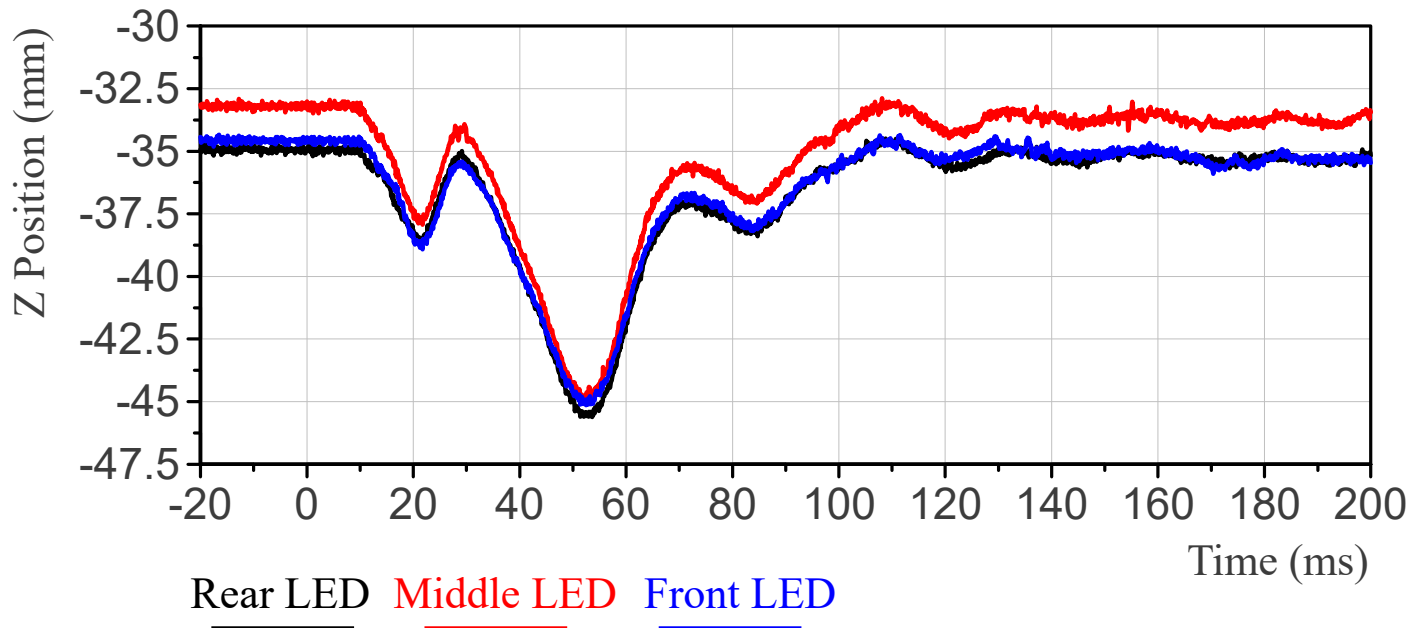
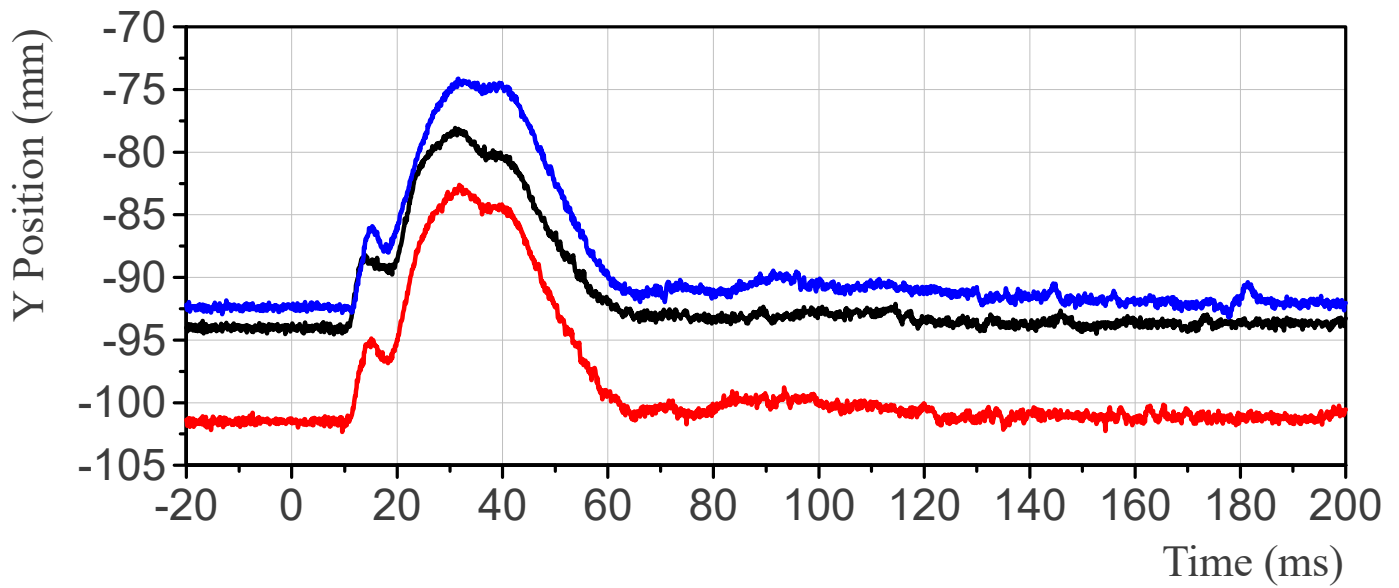
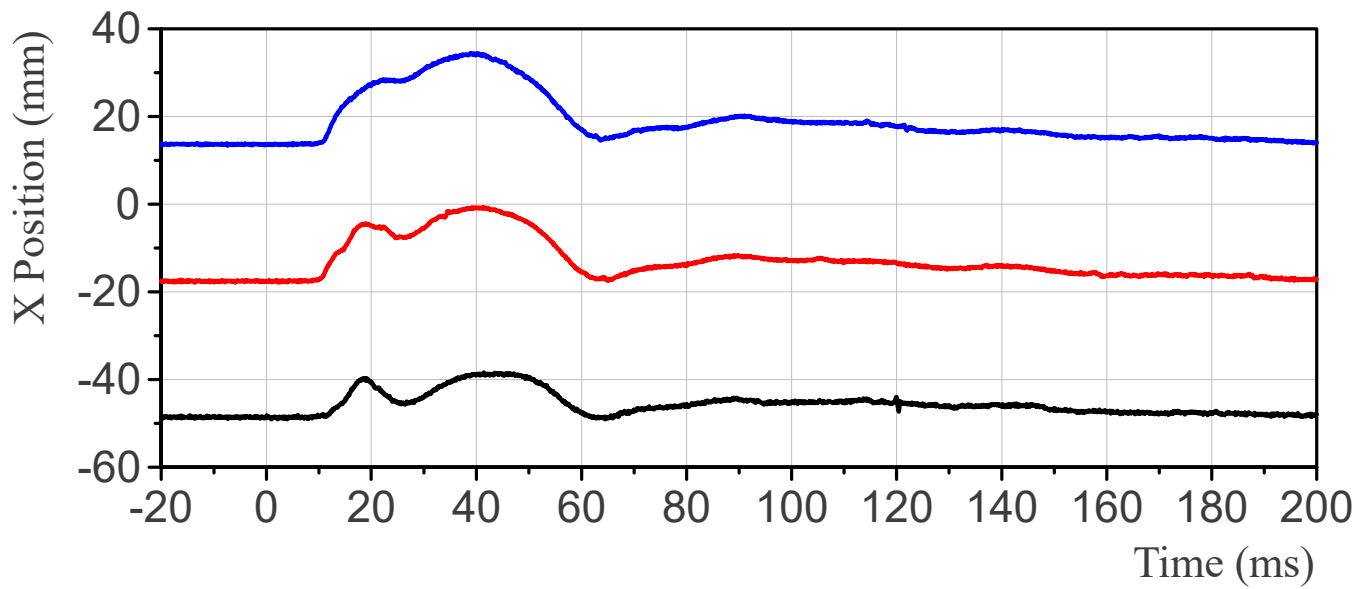
Thorax Rib 1 Absolute Position, Relative to Thorax Rib 1 Origin



Thorax Rib 2 Absolute Position, Relative to Thorax Rib 1 Origin

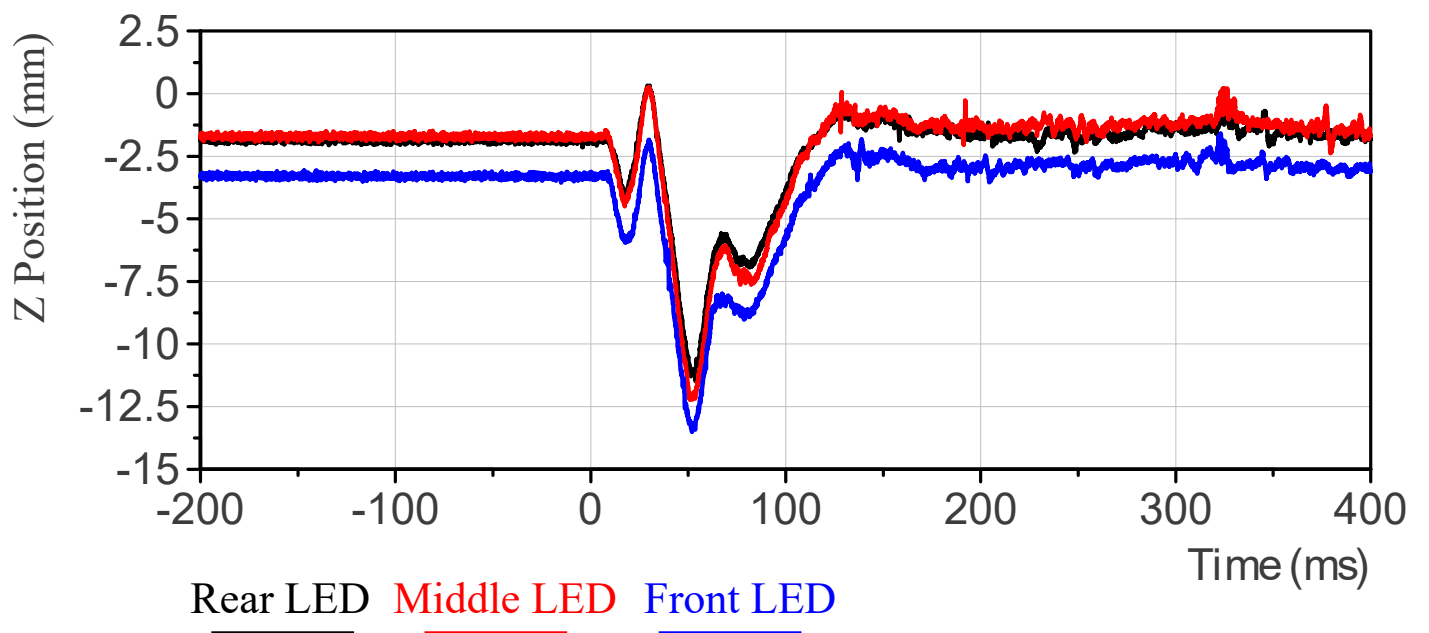
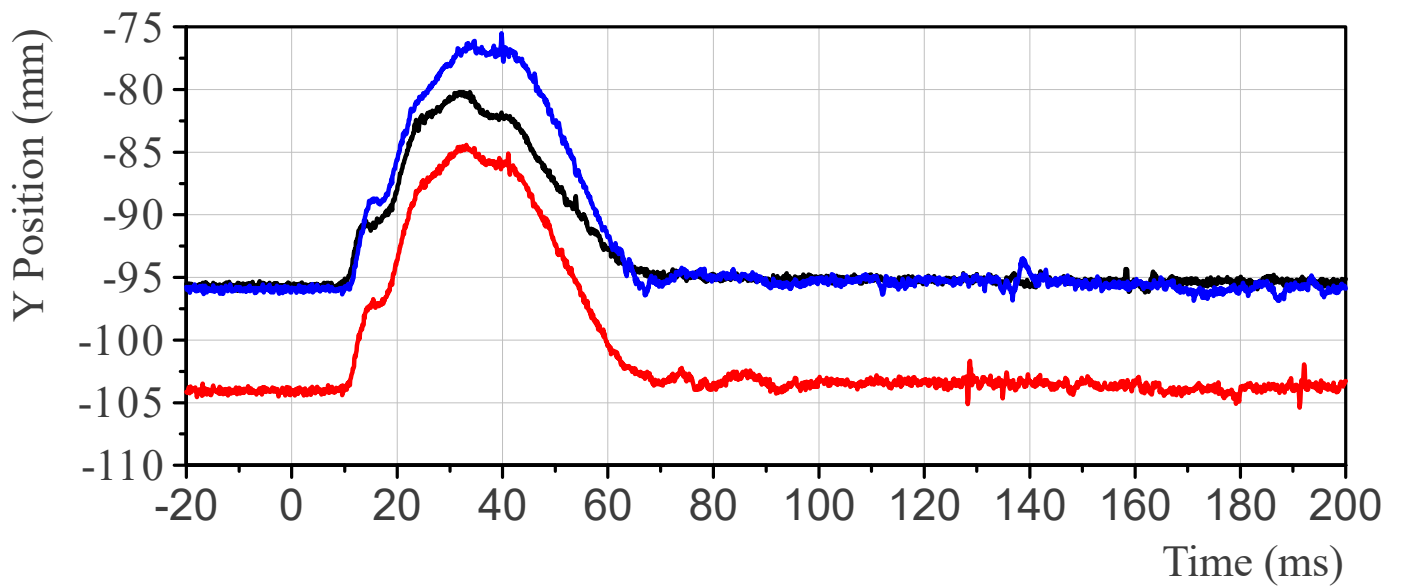
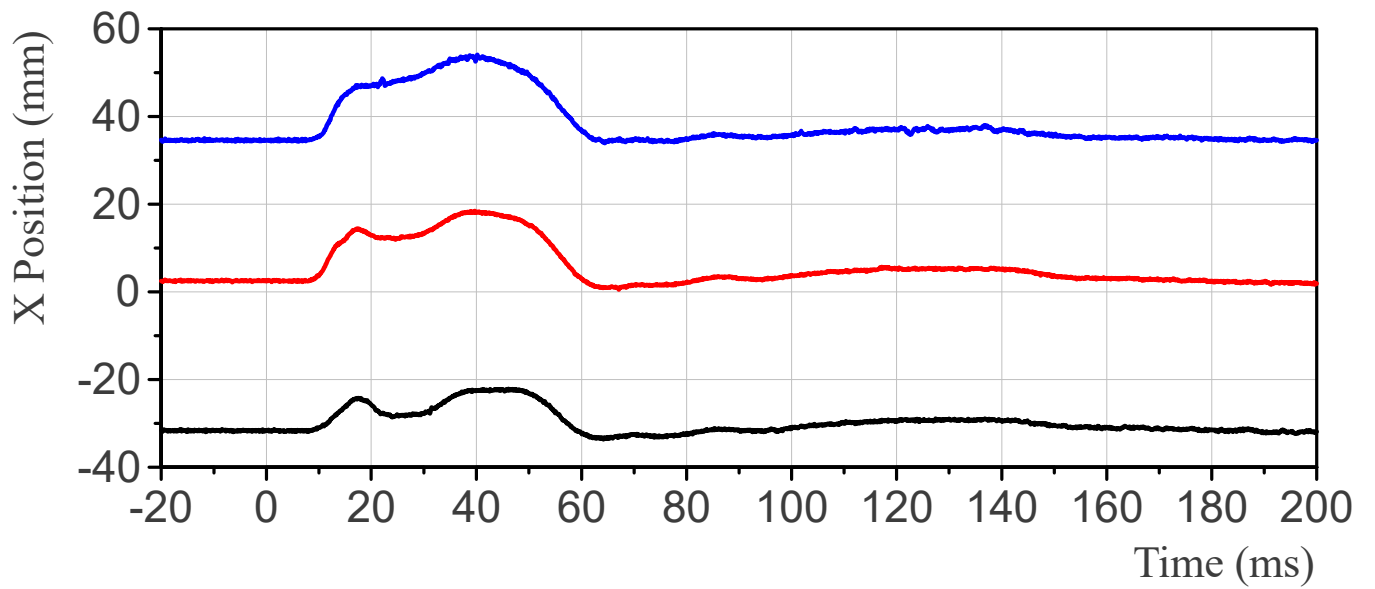


Thorax Rib 3 Absolute Position, Relative to Abdomen Rib 1 Origin



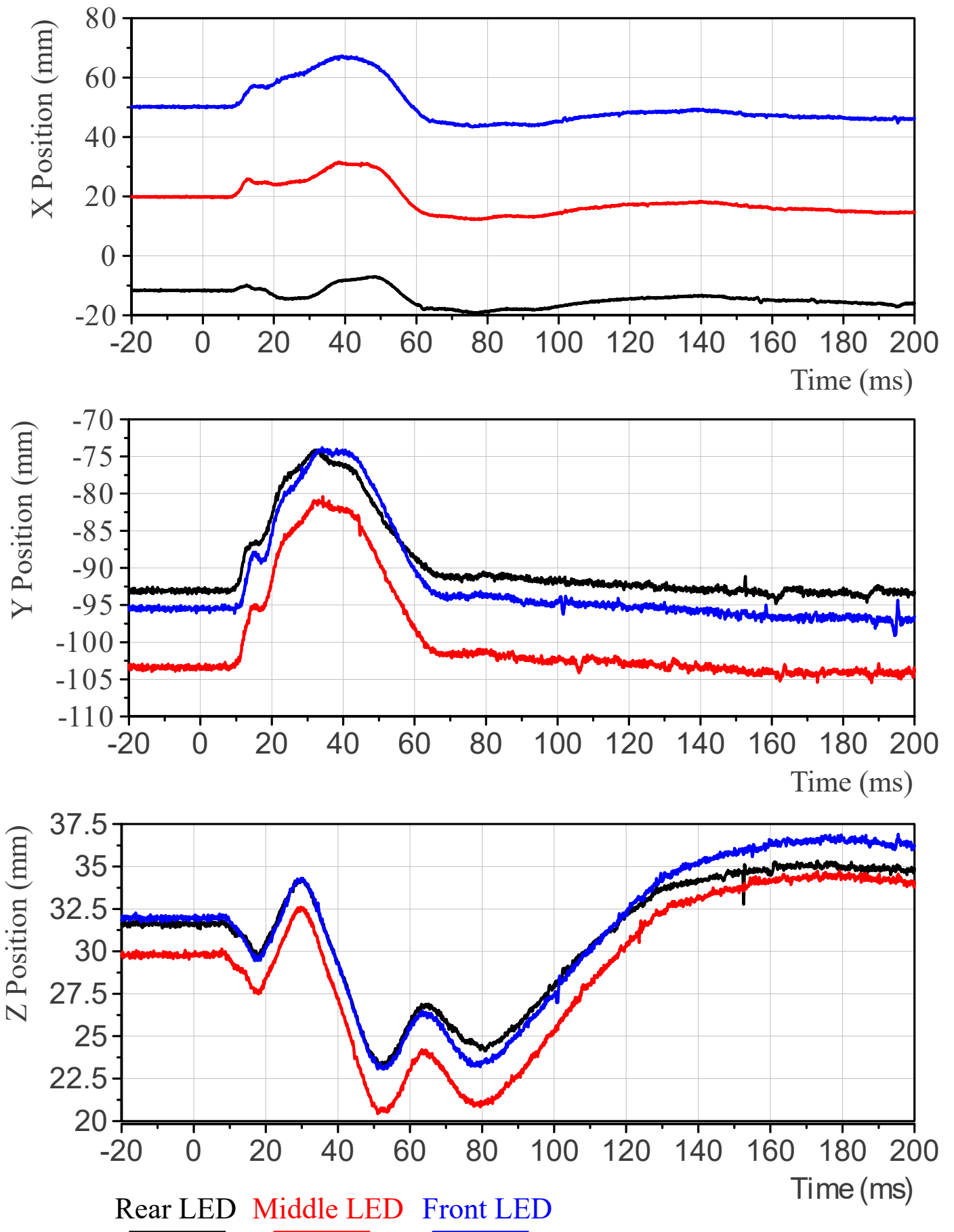
Rear LED Middle LED Front LED

Abdomen Rib 1 Absolute Position, Relative to Abdomen Rib 1 Origin

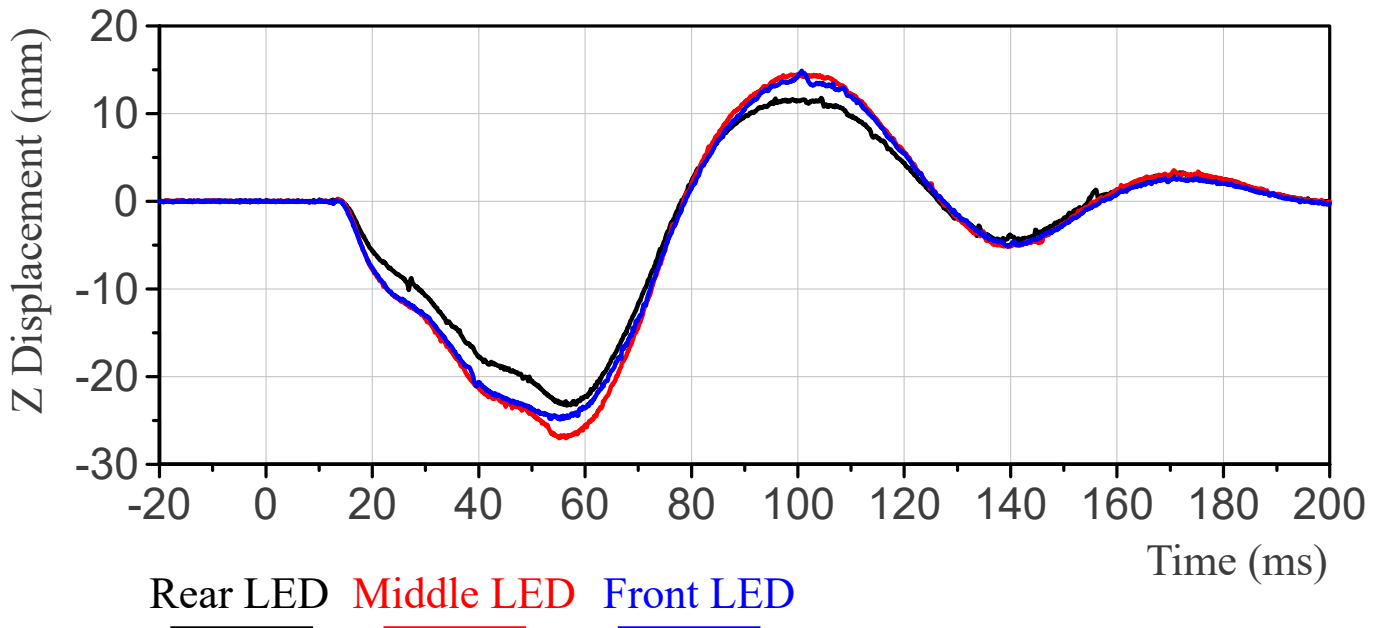
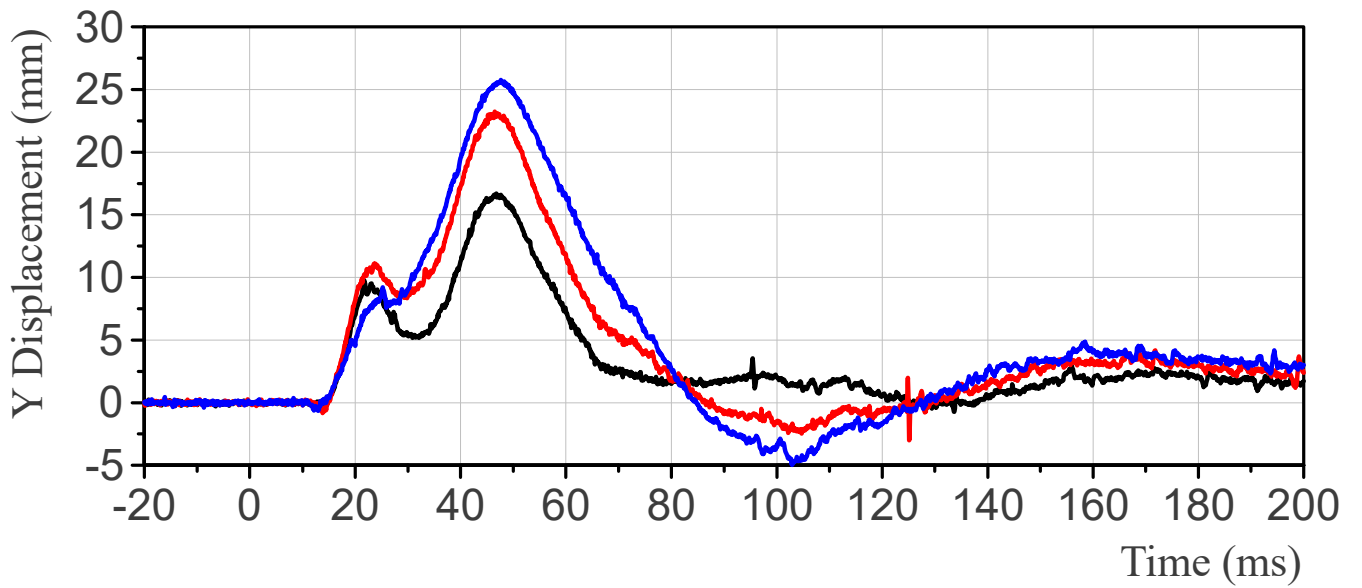
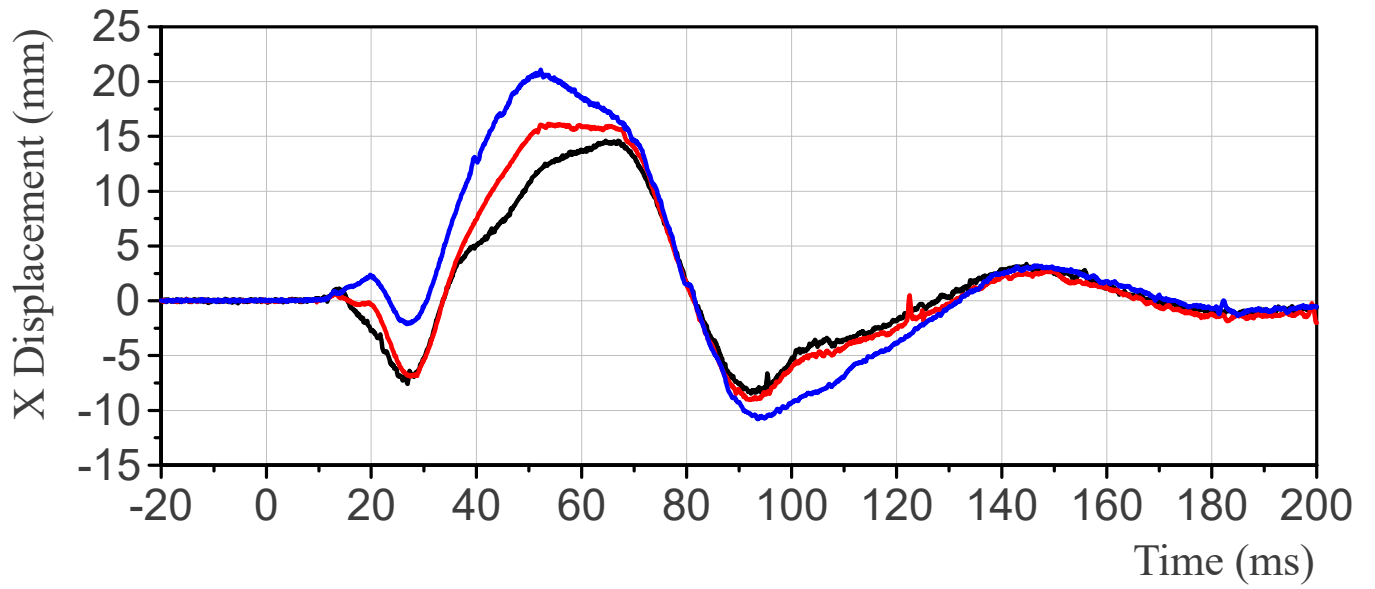


Rear LED Middle LED Front LED

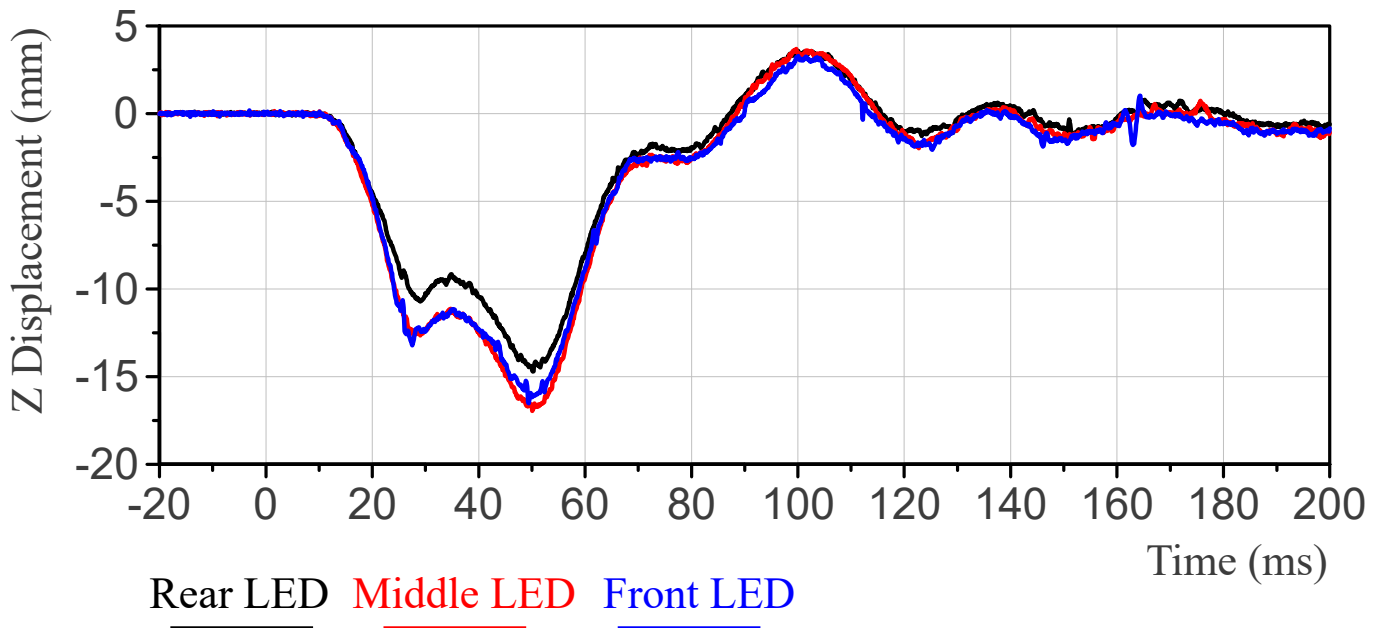
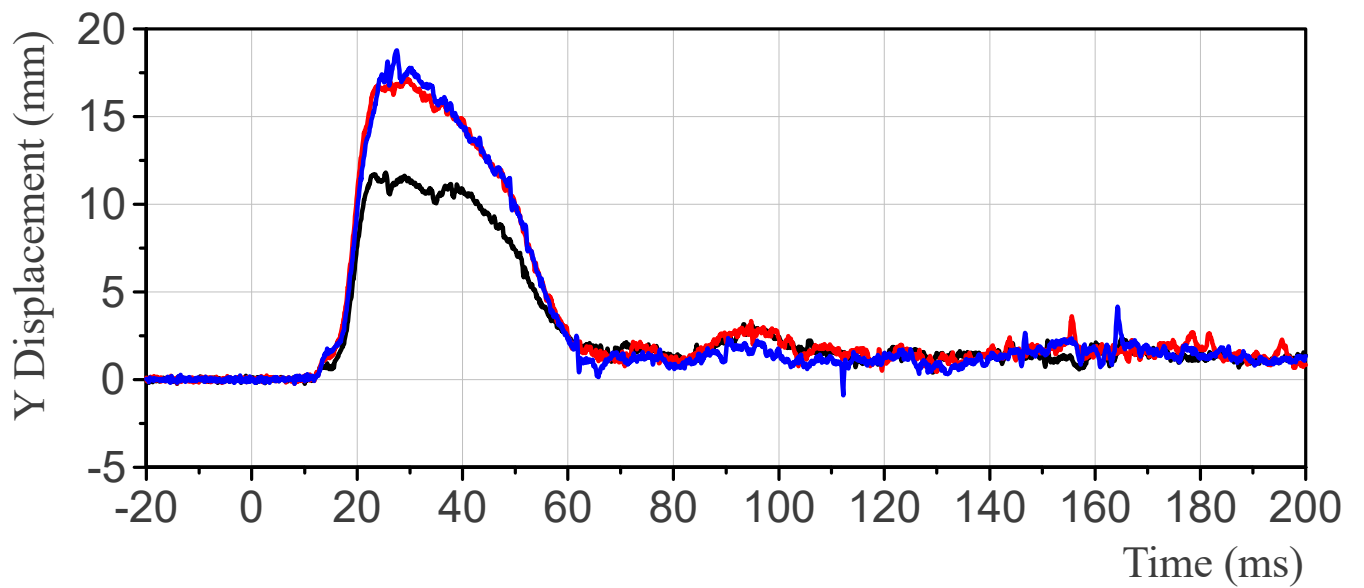
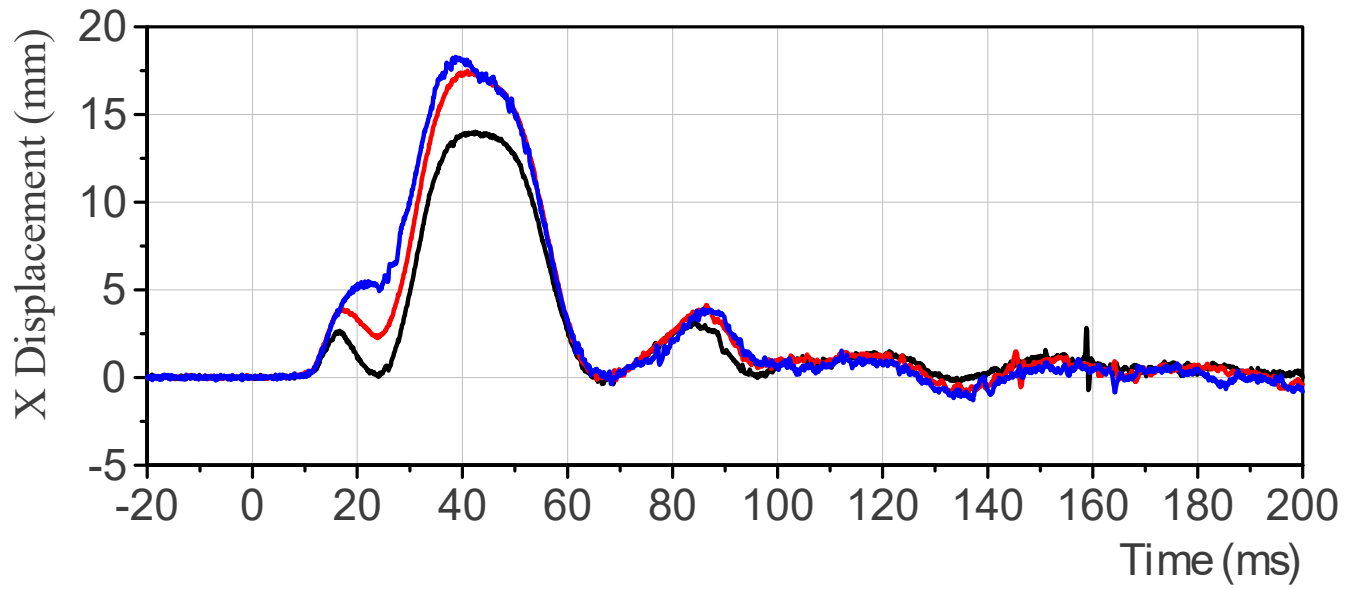
Abdomen Rib 2 Absolute Position, Relative to Abdomen Rib 1 Origin



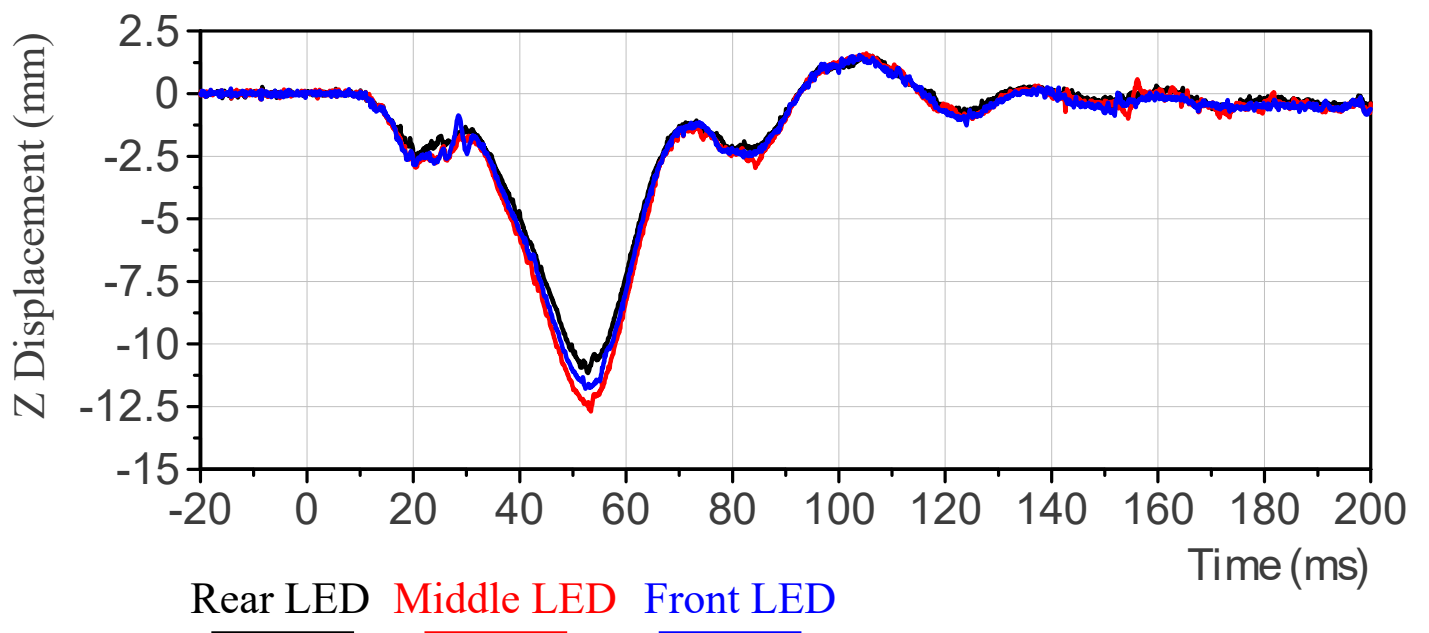
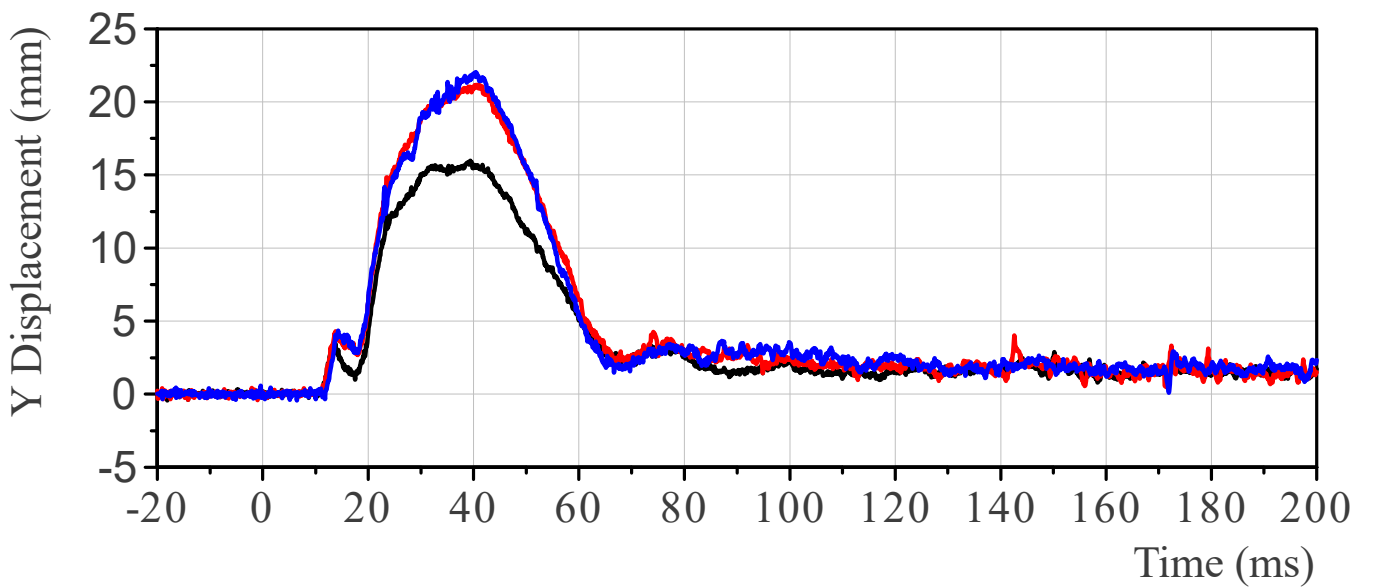
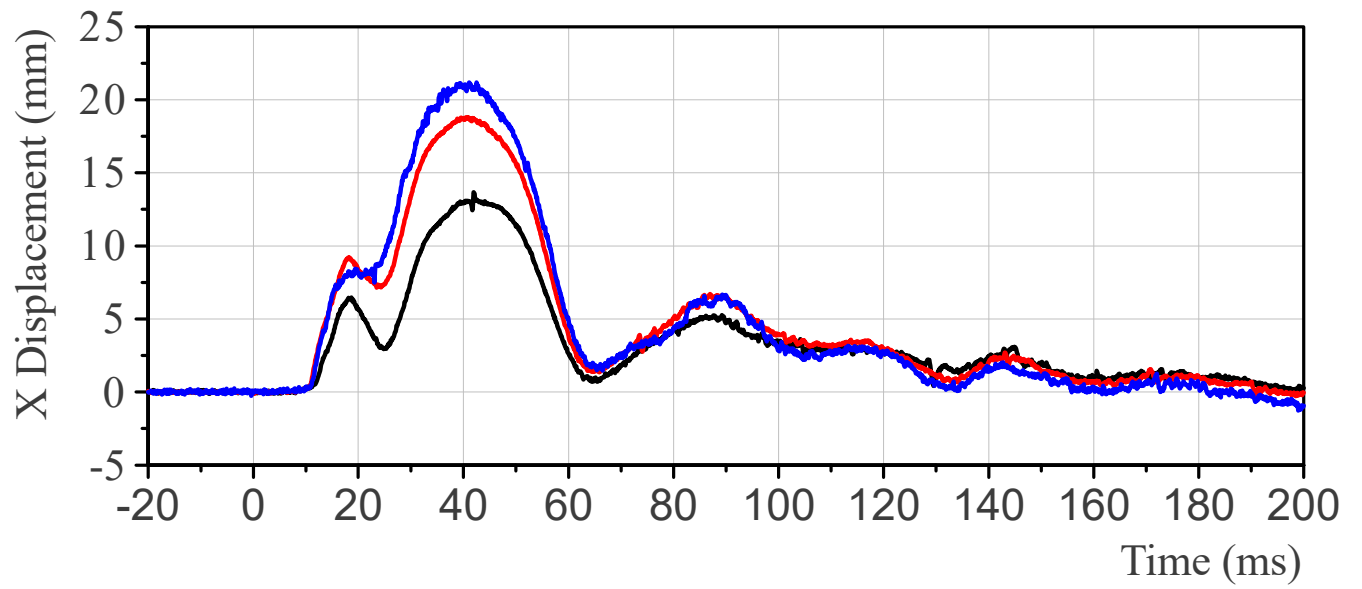
Shoulder Rib Displacement



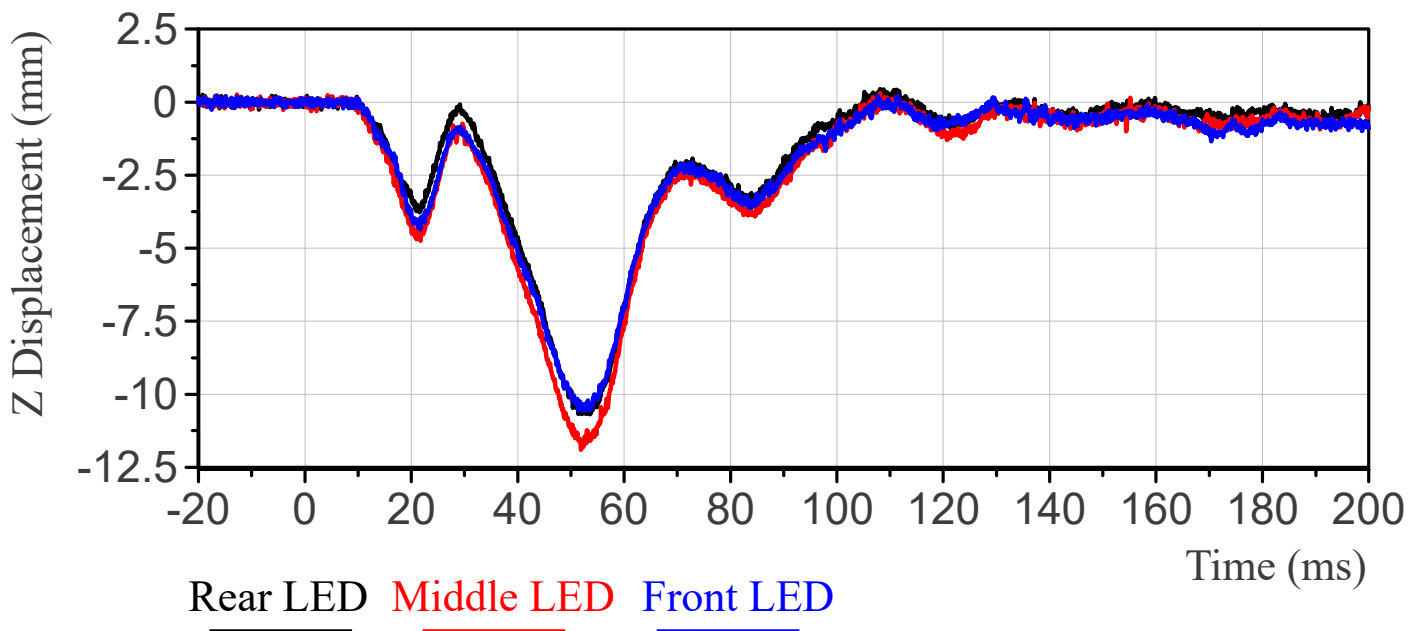
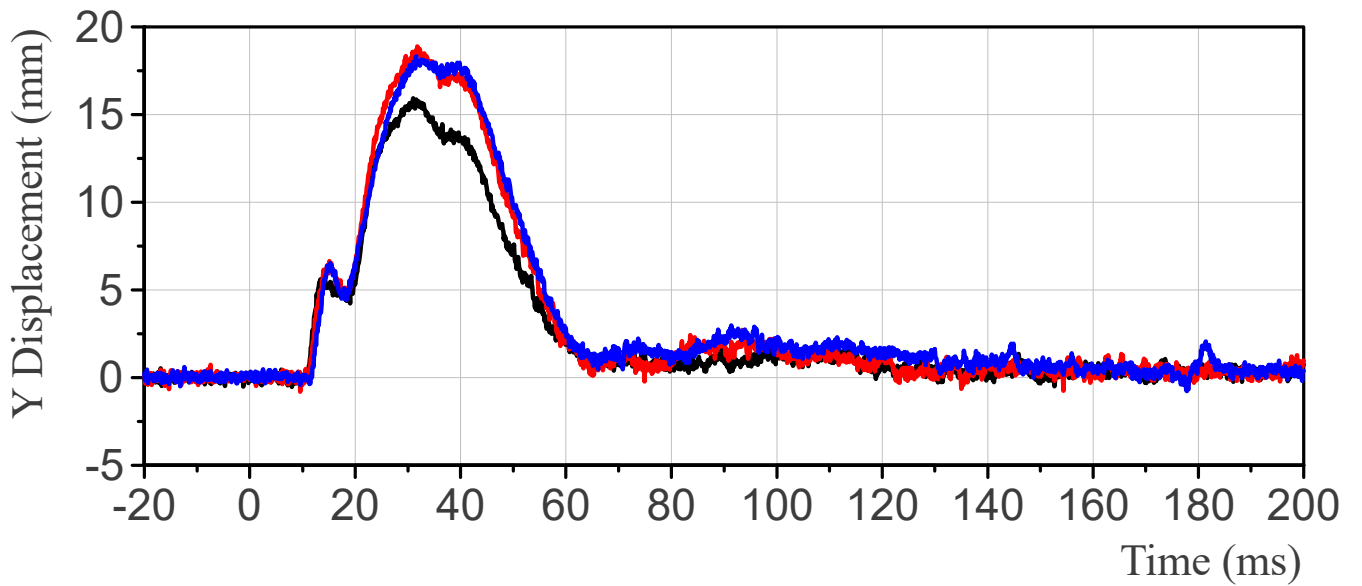
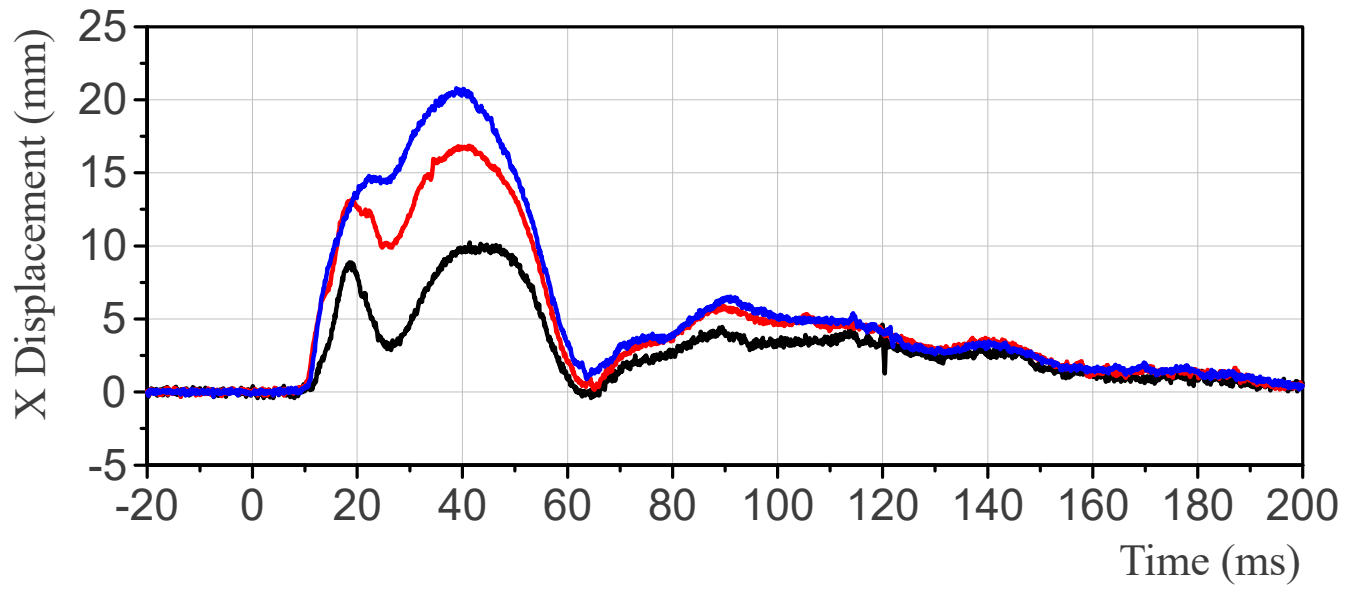
Thorax Rib 1 Displacement



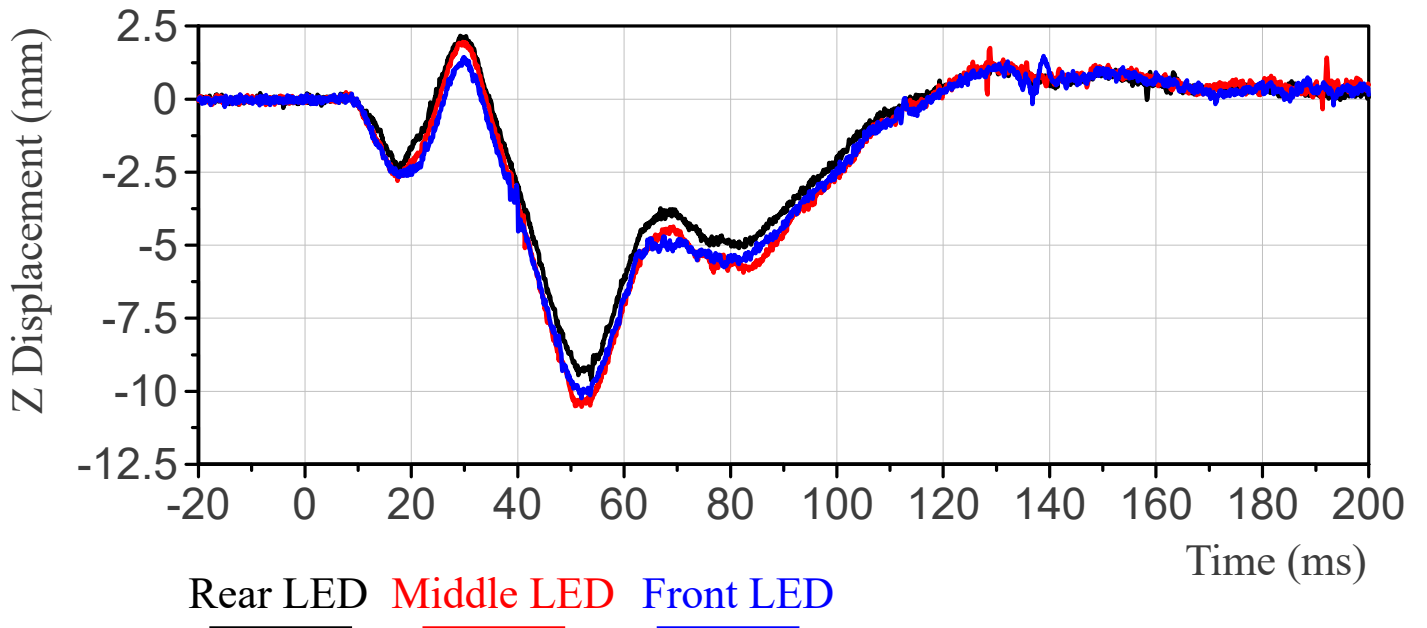
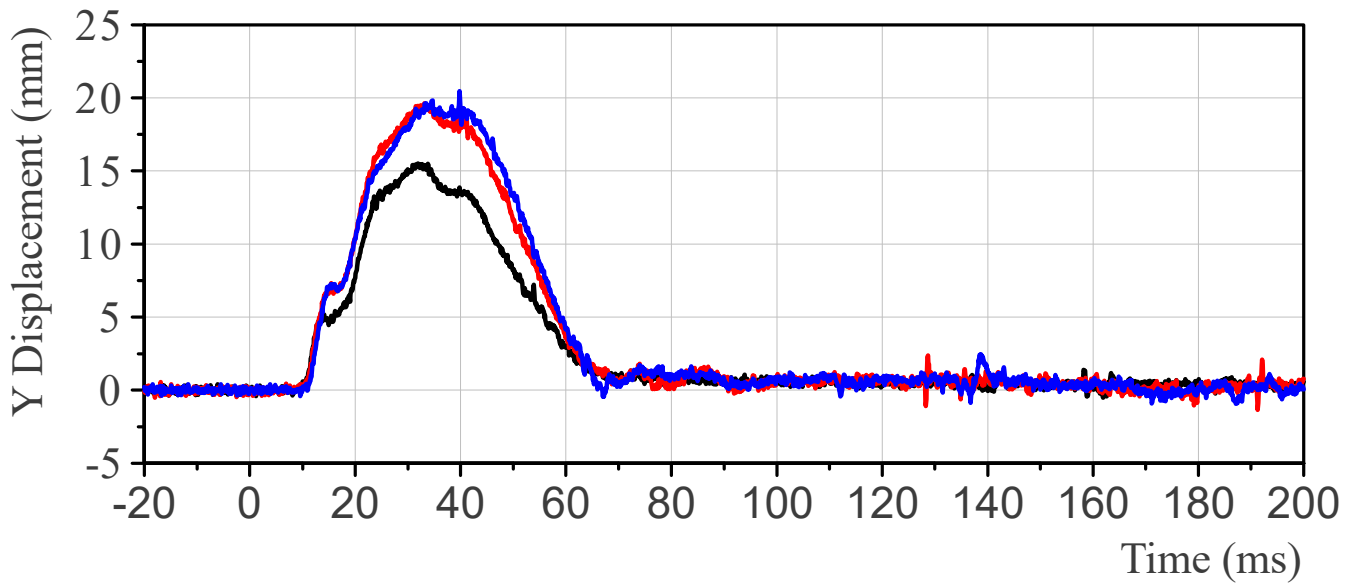
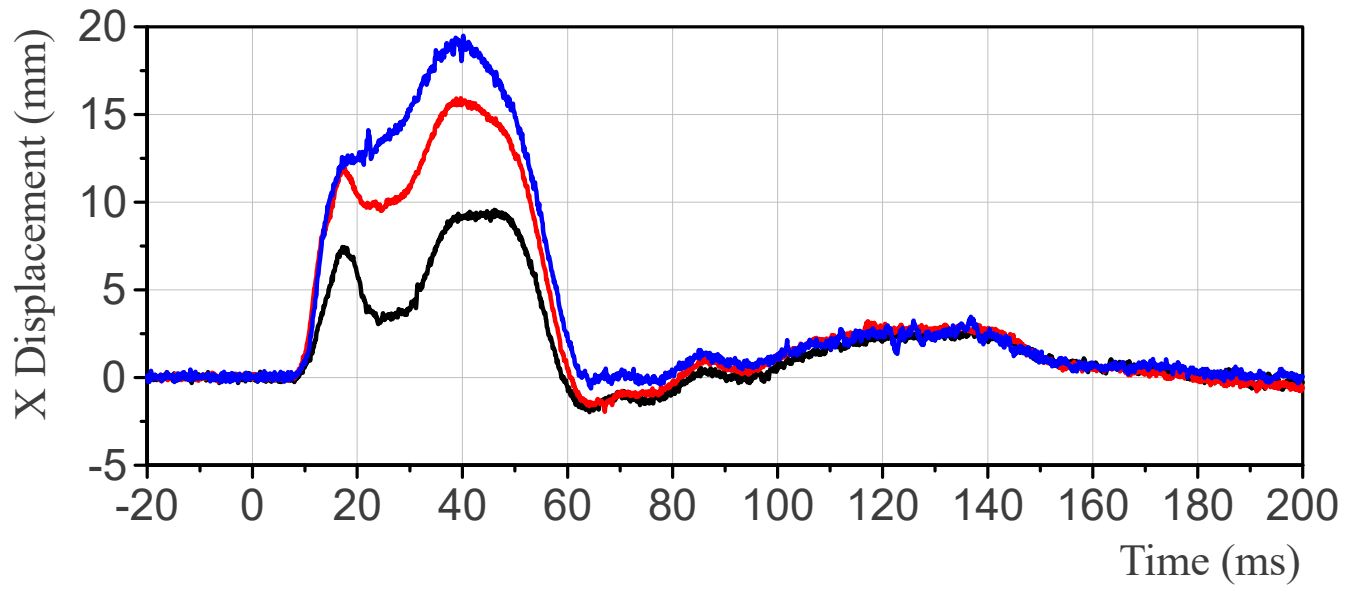
Thorax Rib 2 Displacement



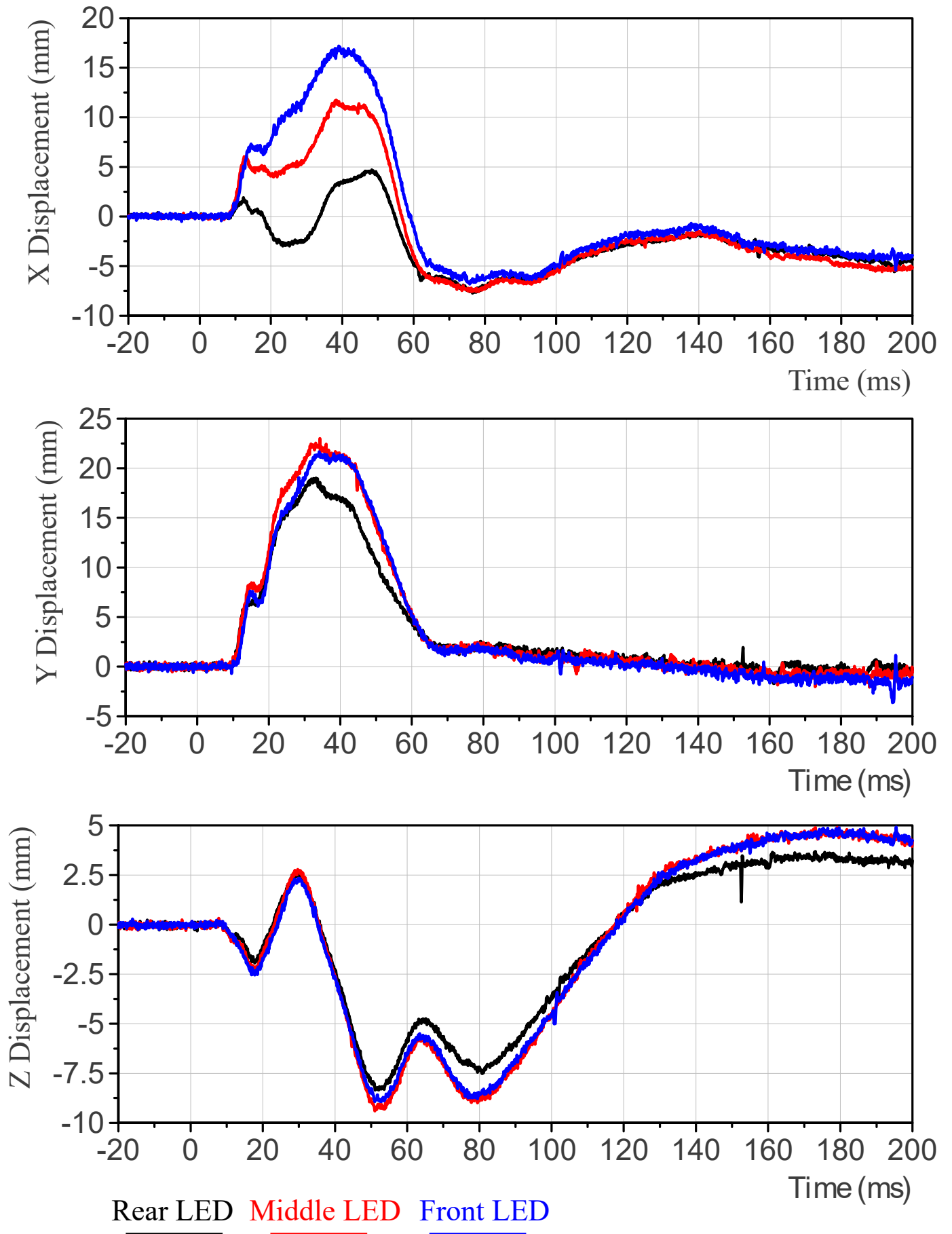
Thorax Rib 3 Displacement



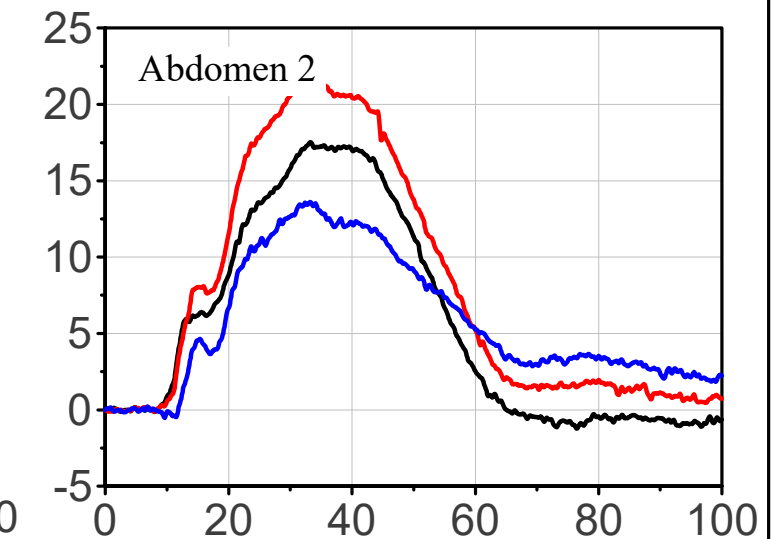
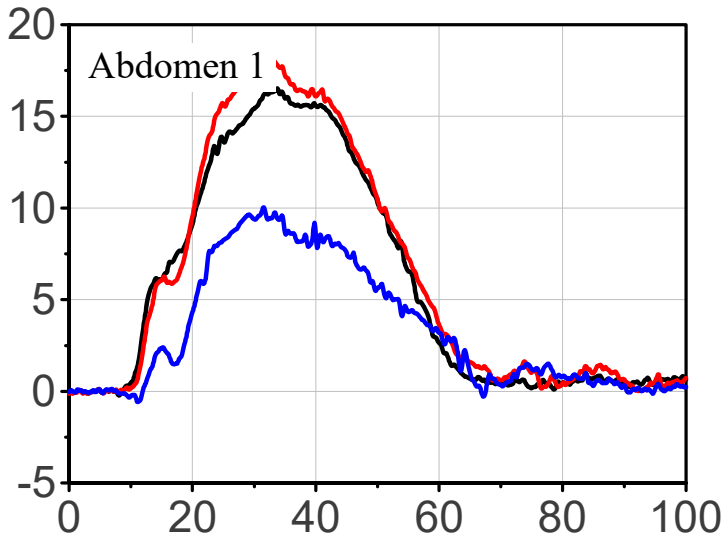
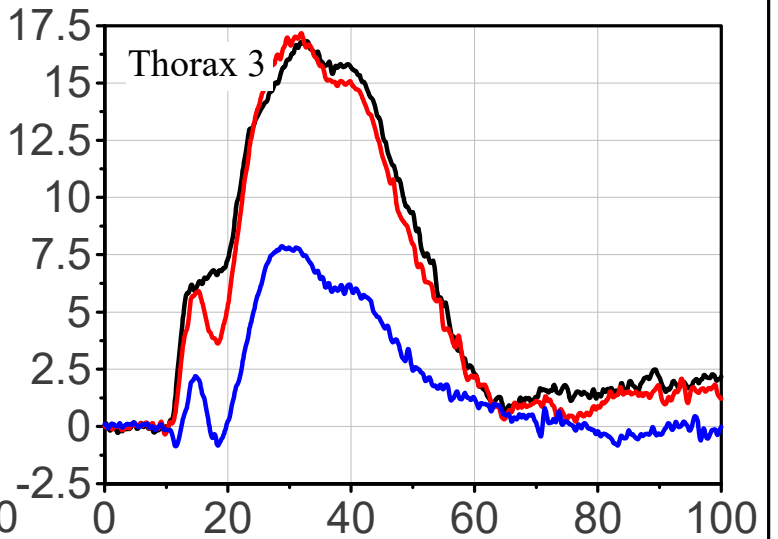
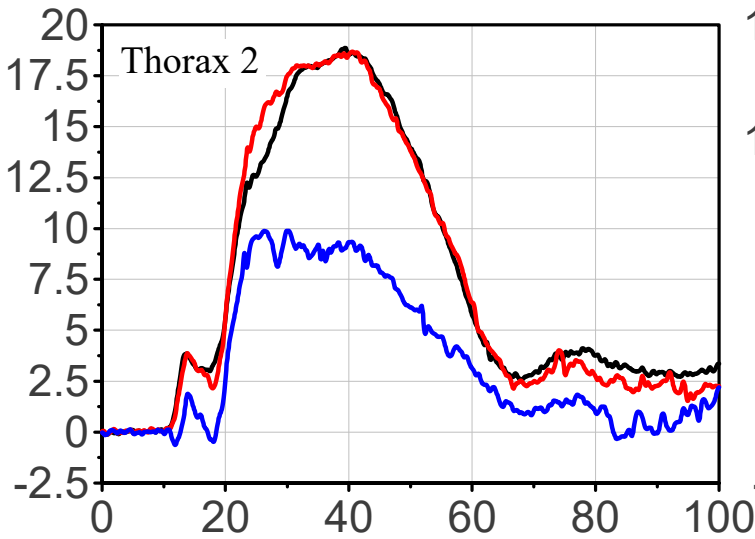
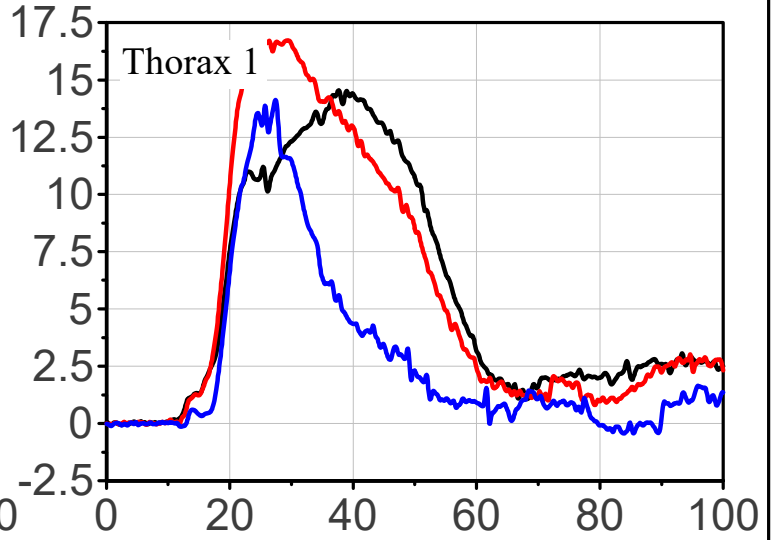
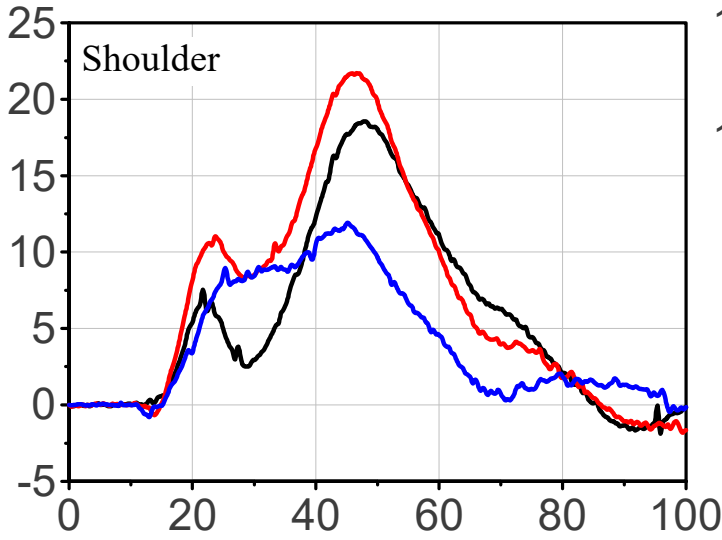
Abdomen Rib 1 Displacement



Abdomen Rib 2 Displacement

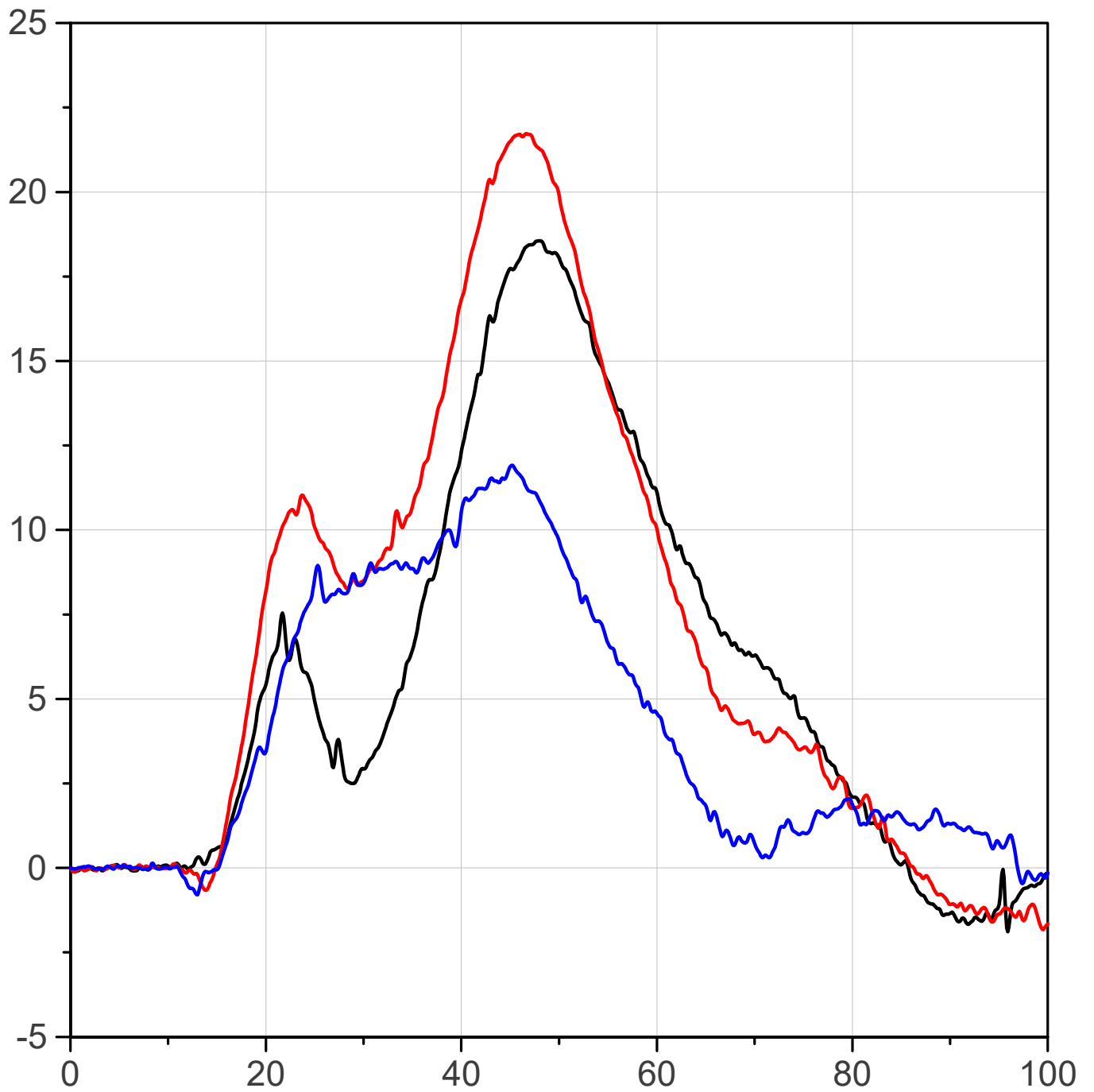


Rib Length Change (mm) vs. Time (ms)



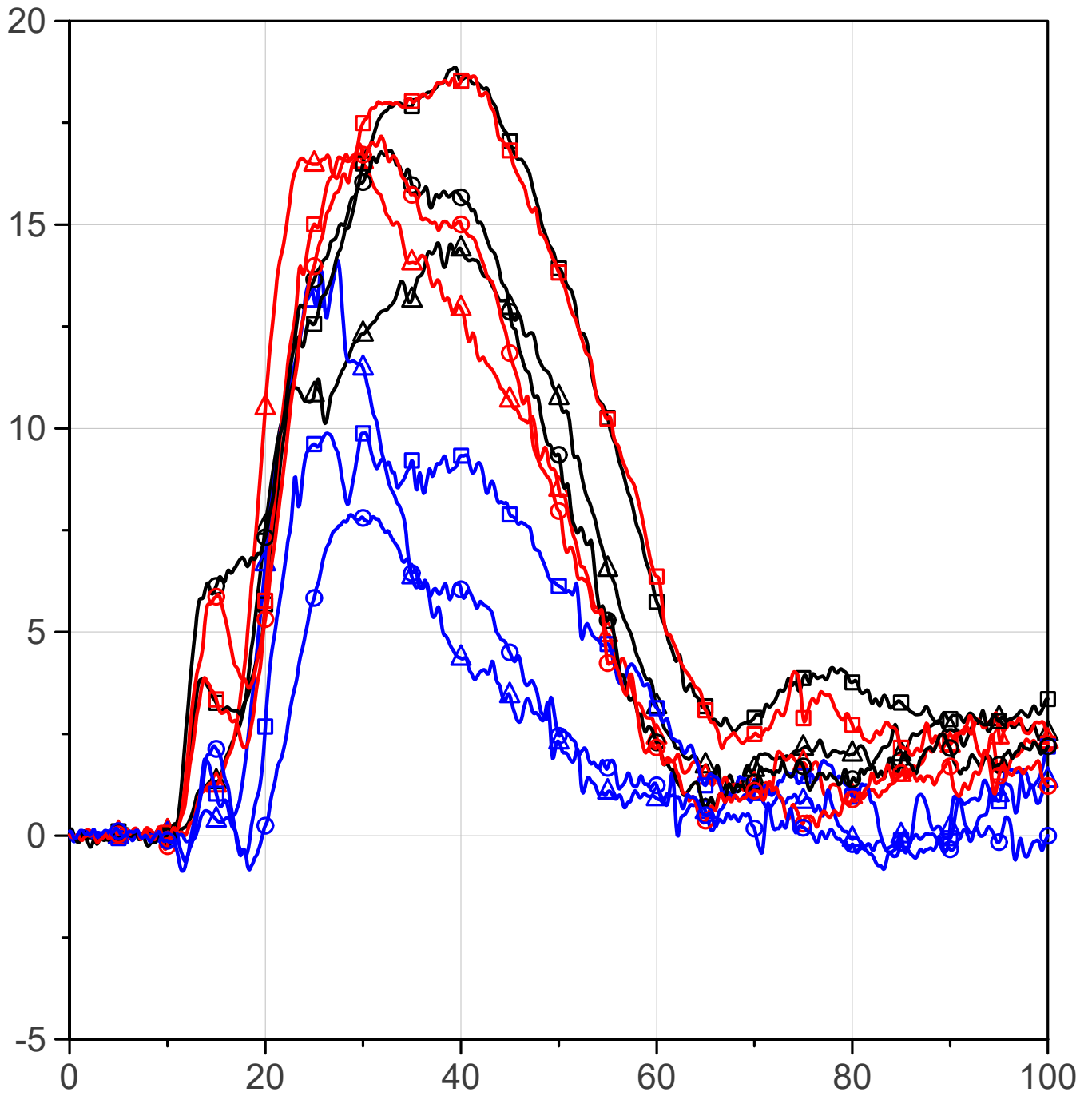
Rear LED Middle LED Front LED

Shoulder Rib Length Change (mm) vs. Time (ms)



 Rear LED Middle LED Front LED

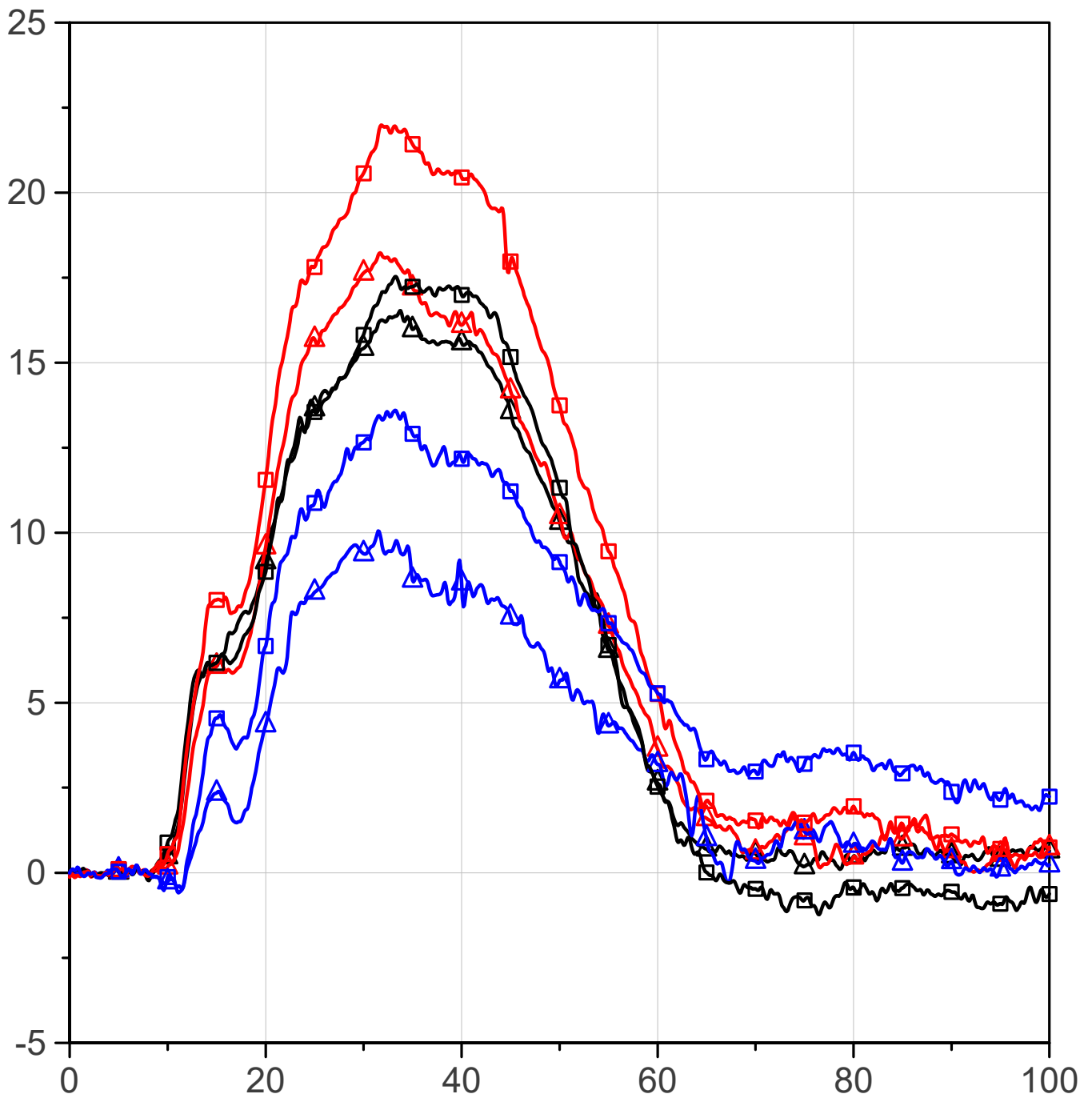
Thorax Rib Length Change (mm) vs. Time (ms)



Rear LED Middle LED Front LED

△	Thorax Rib 1
□	Thorax Rib 2
○	Thorax Rib 3

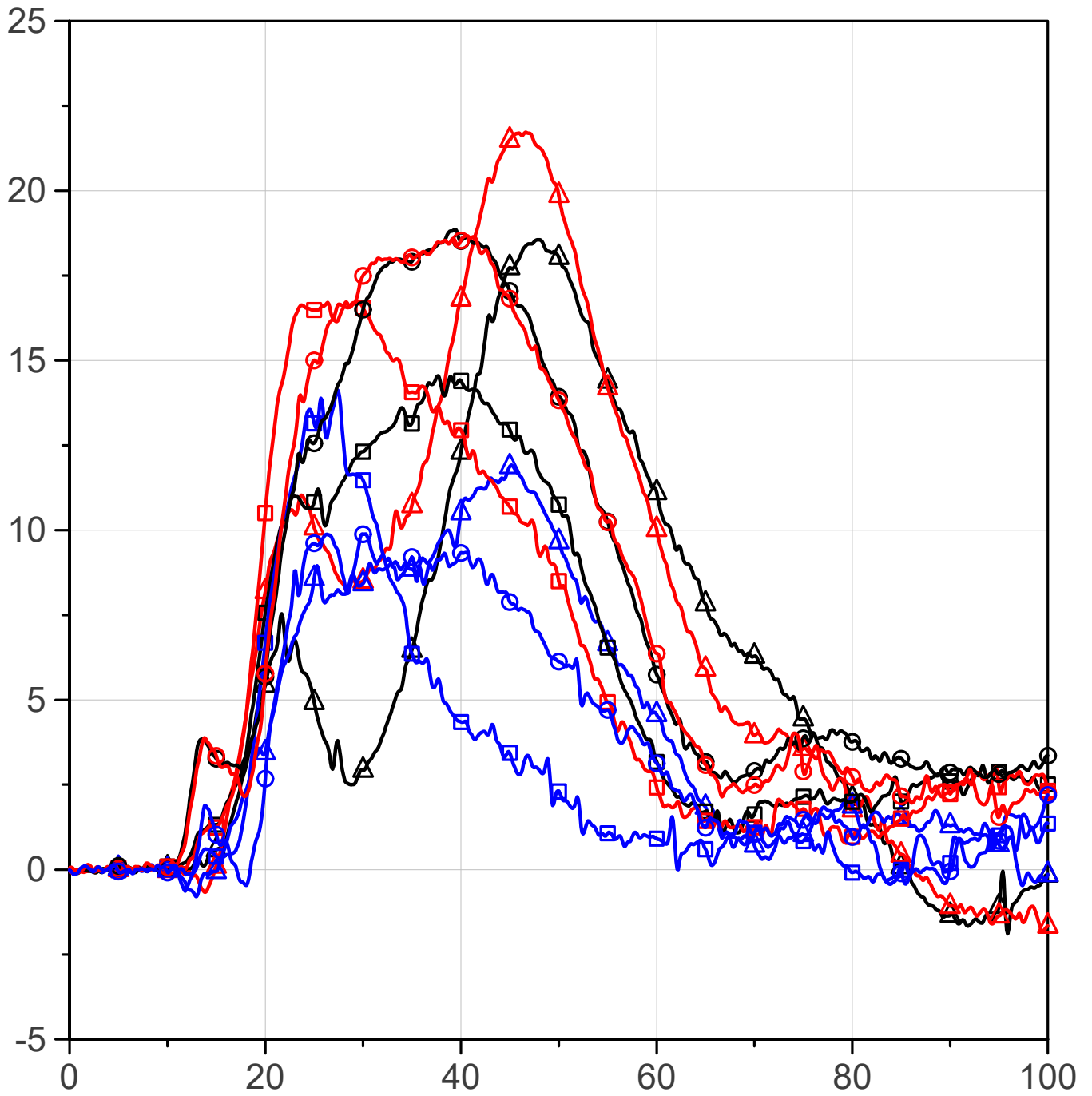
Abdomen Rib Length Change (mm) vs. Time (ms)



Rear LED Middle LED Front LED

△ Abdomen Rib 1
□ Abdomen Rib 2

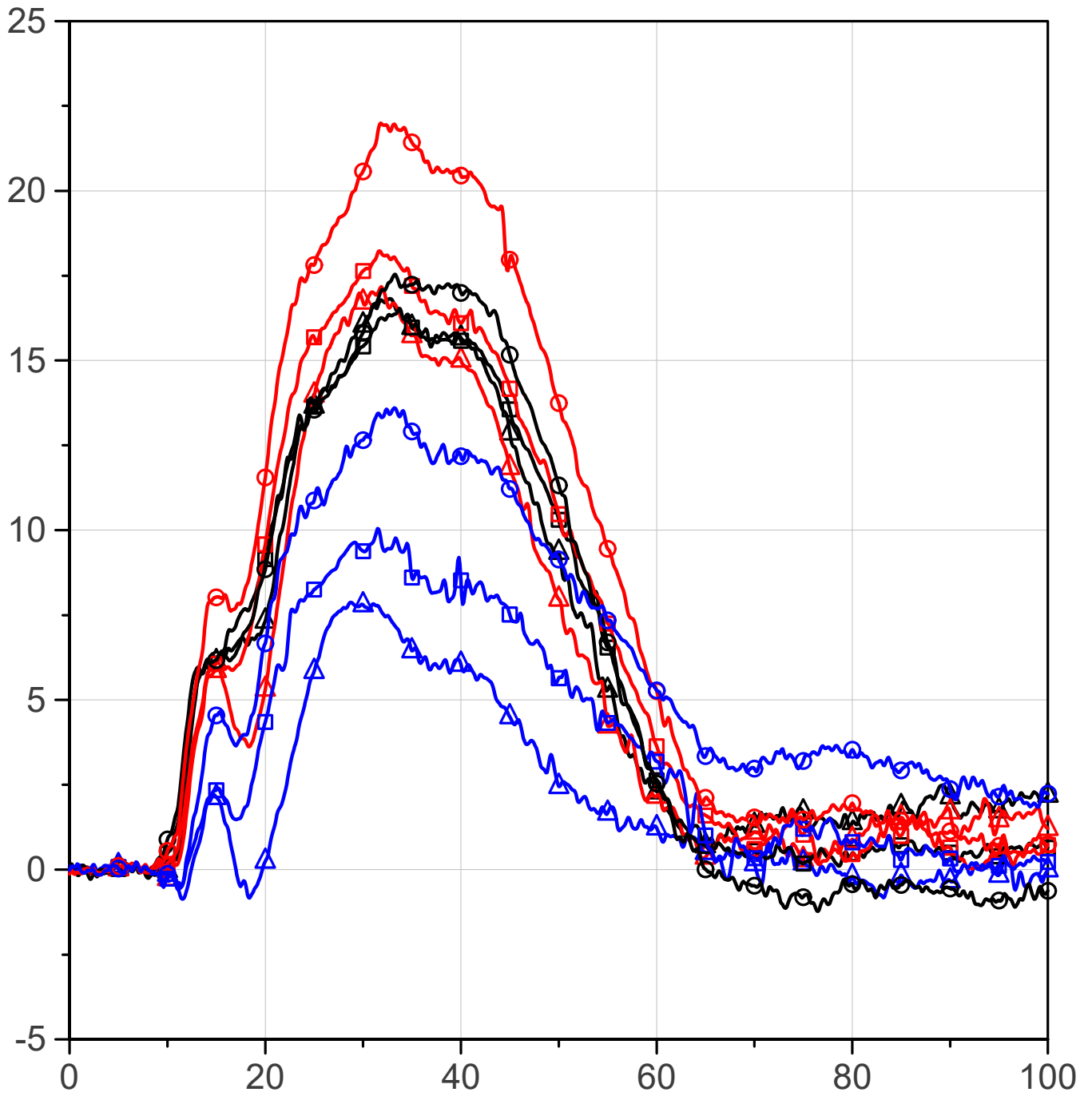
Upper Rib group Length Change (mm) vs. Time (ms)



Rear LED Middle LED Front LED

- △ Shoulder Rib
- Thorax Rib 1
- Thorax Rib 2

Lower Rib Group Length Change (mm) vs. Time (ms)

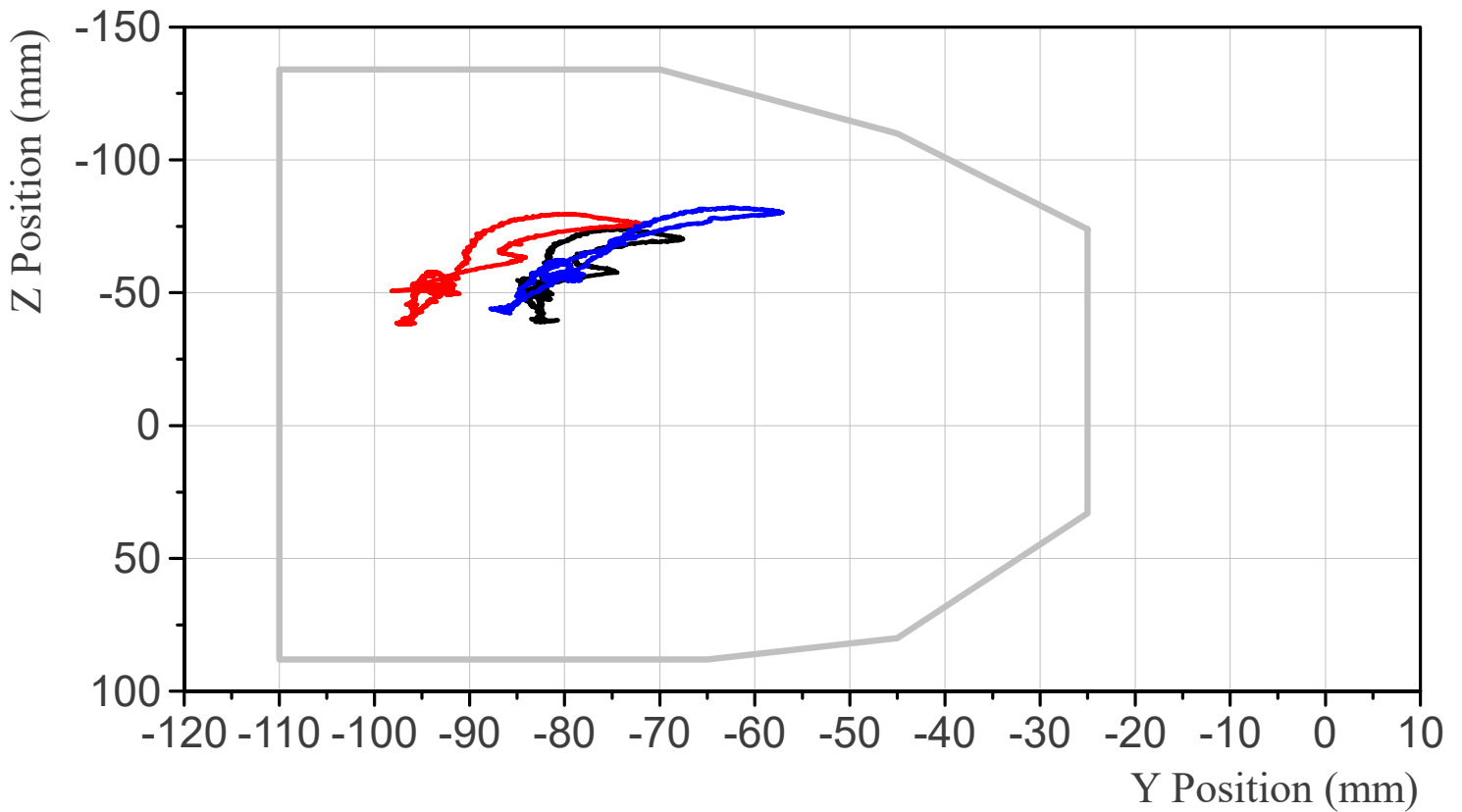
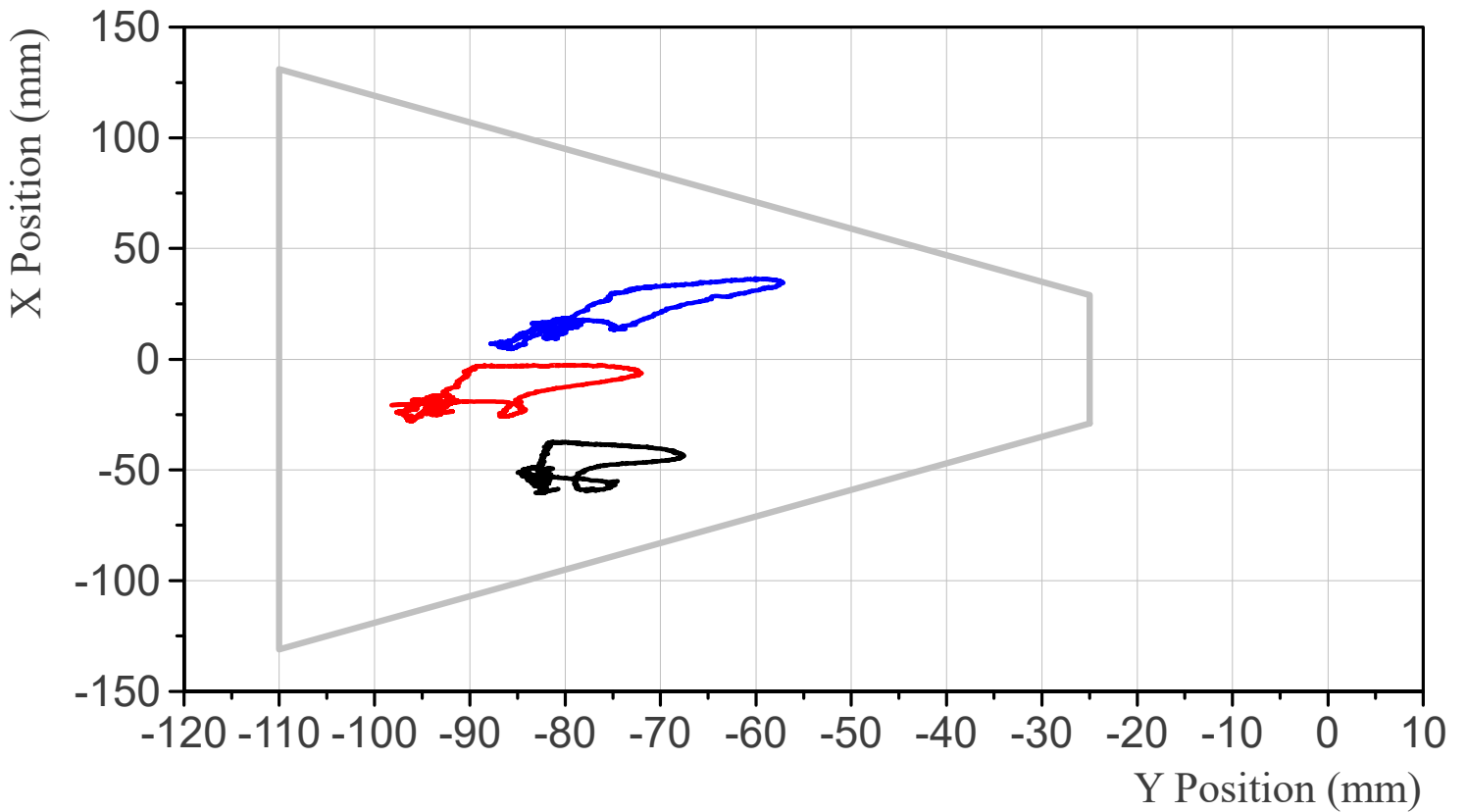


Rear LED Middle LED Front LED

△	Thorax Rib 3
□	Abdomen Rib 1
○	Abdomen Rib 2

RibEye Measurement Range Plot

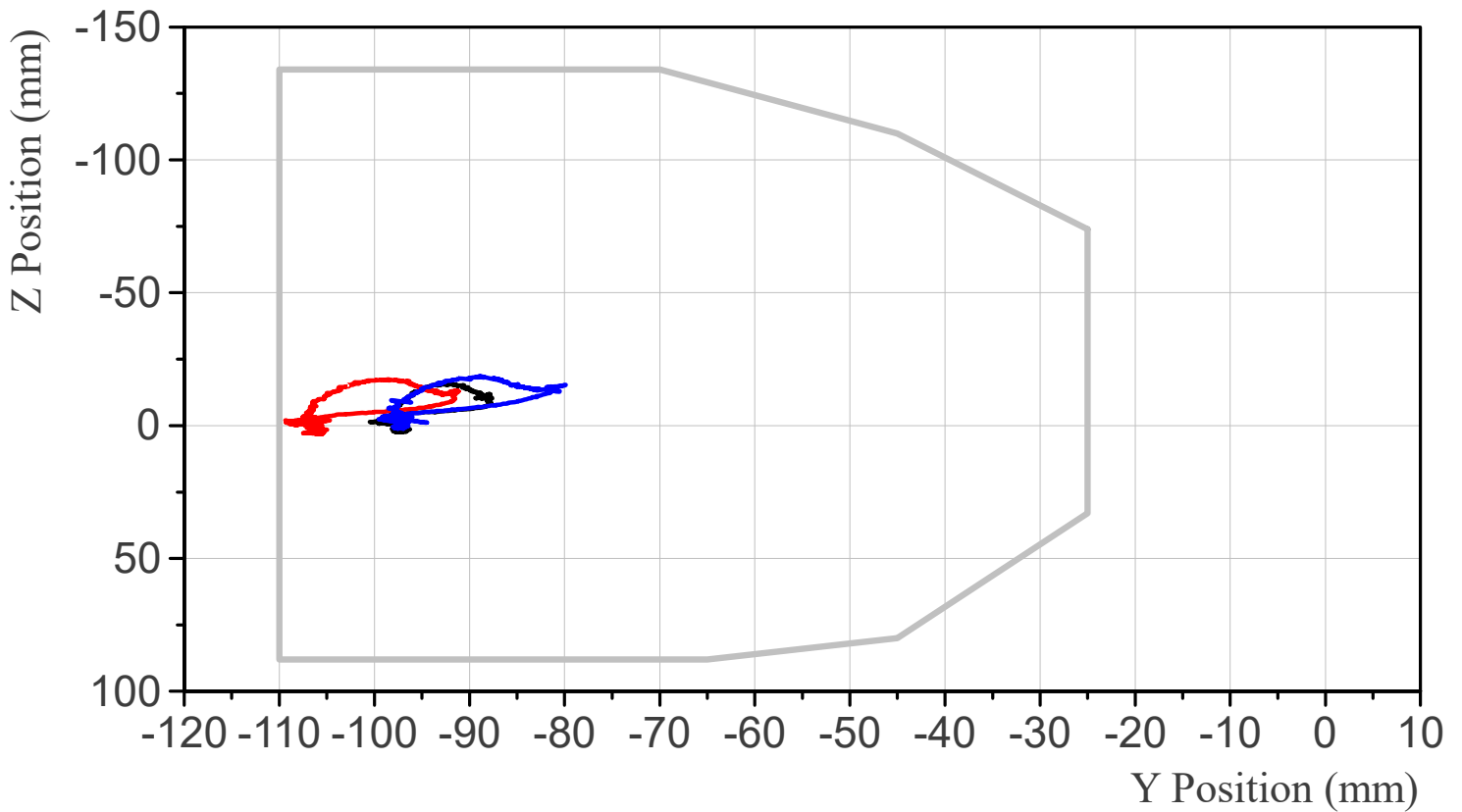
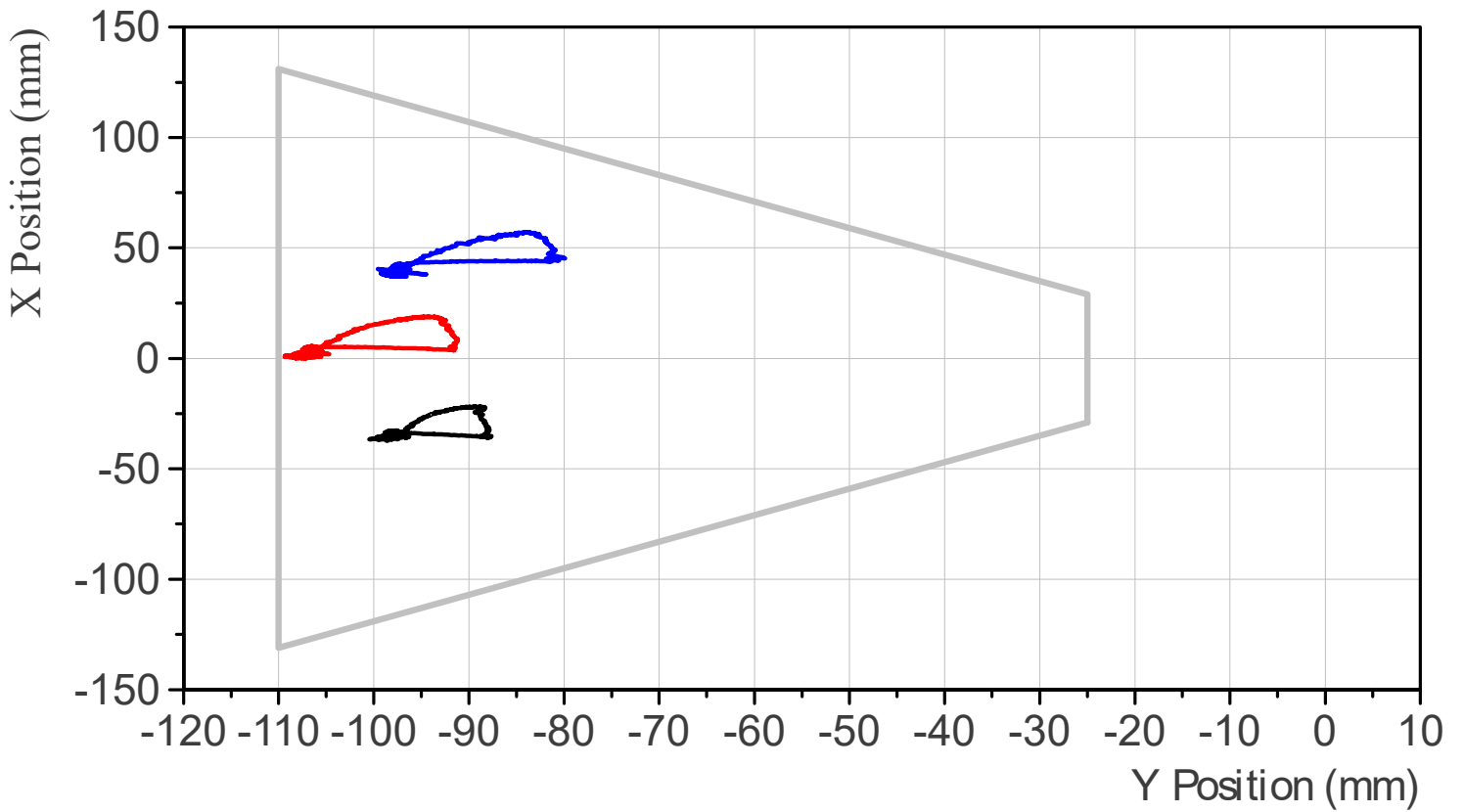
Shoulder Rib Absolute Position, Relative to Thorax Rib 1 Origin



Rear LED Middle LED Front LED

RibEye Measurement Range Plot

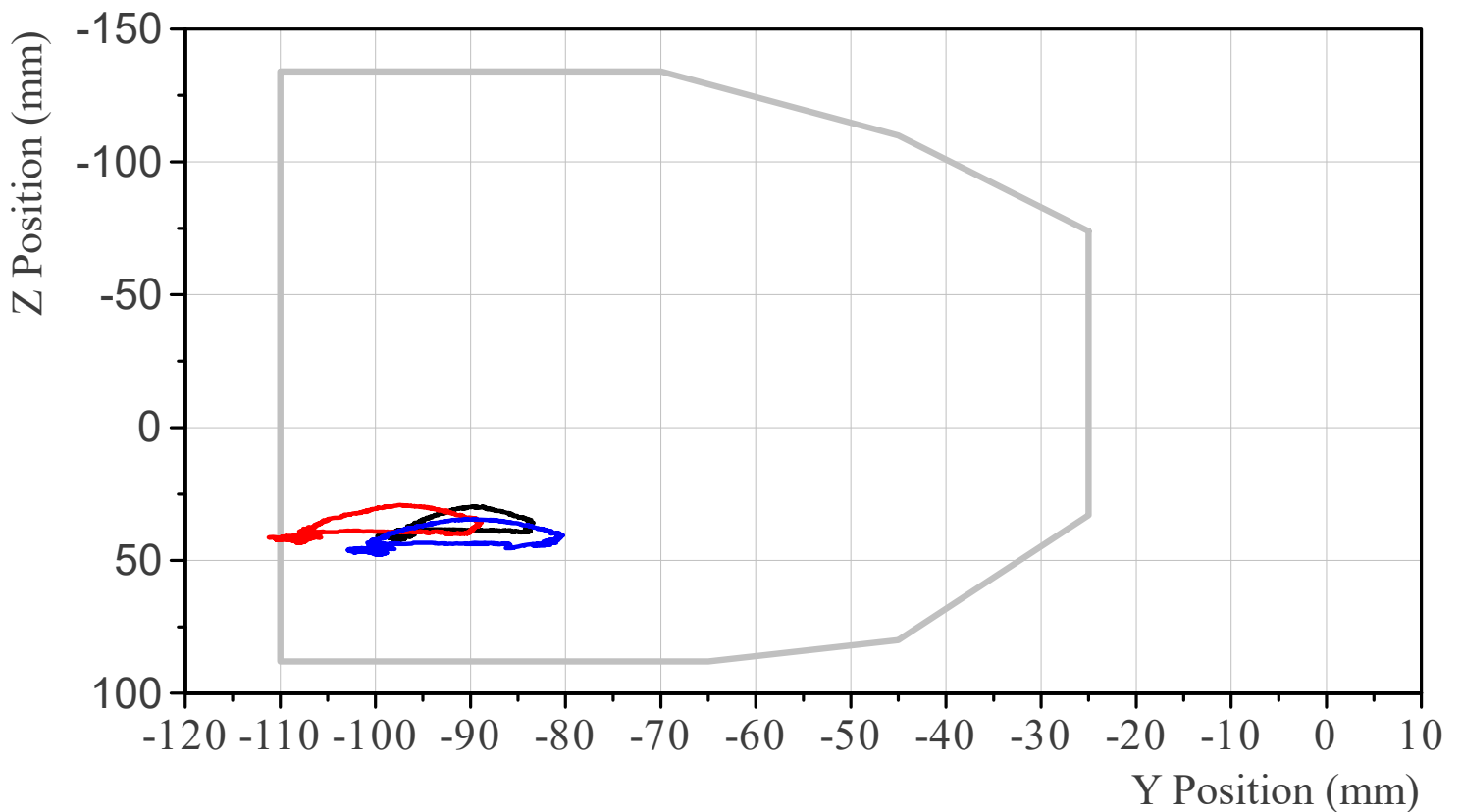
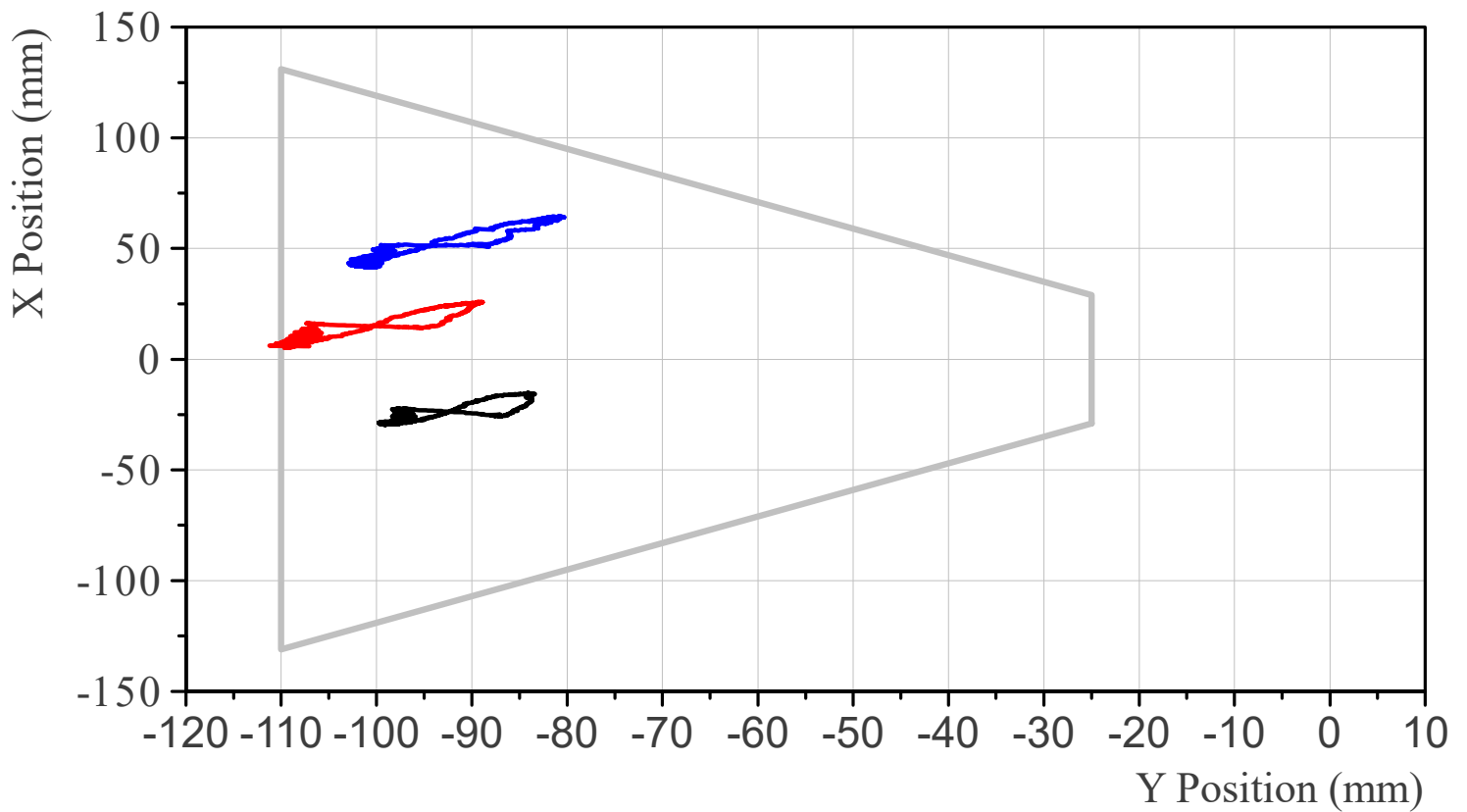
Thorax Rib 1 Absolute Position, Relative to Thorax Rib 1 Origin



Rear LED Middle LED Front LED

RibEye Measurement Range Plot

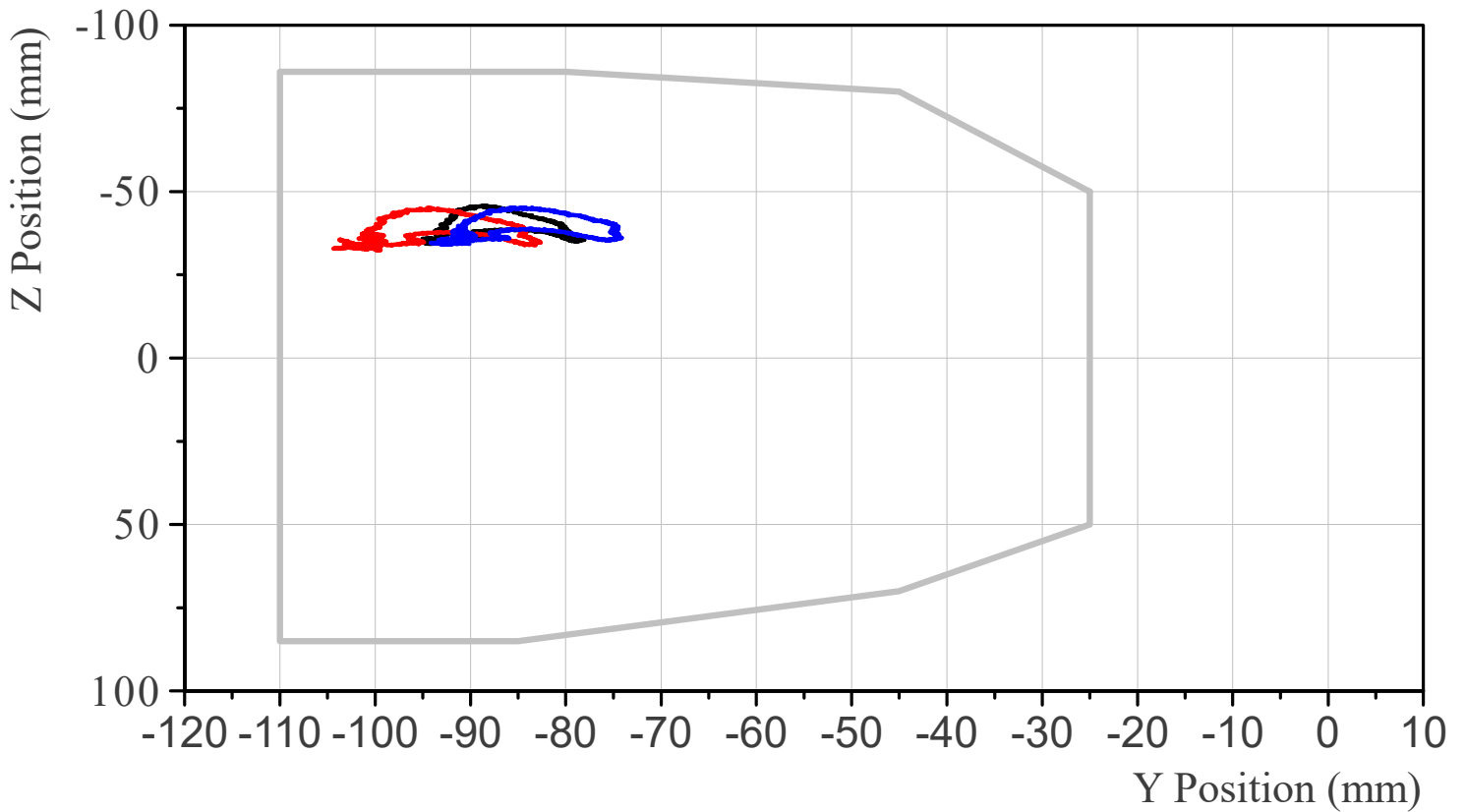
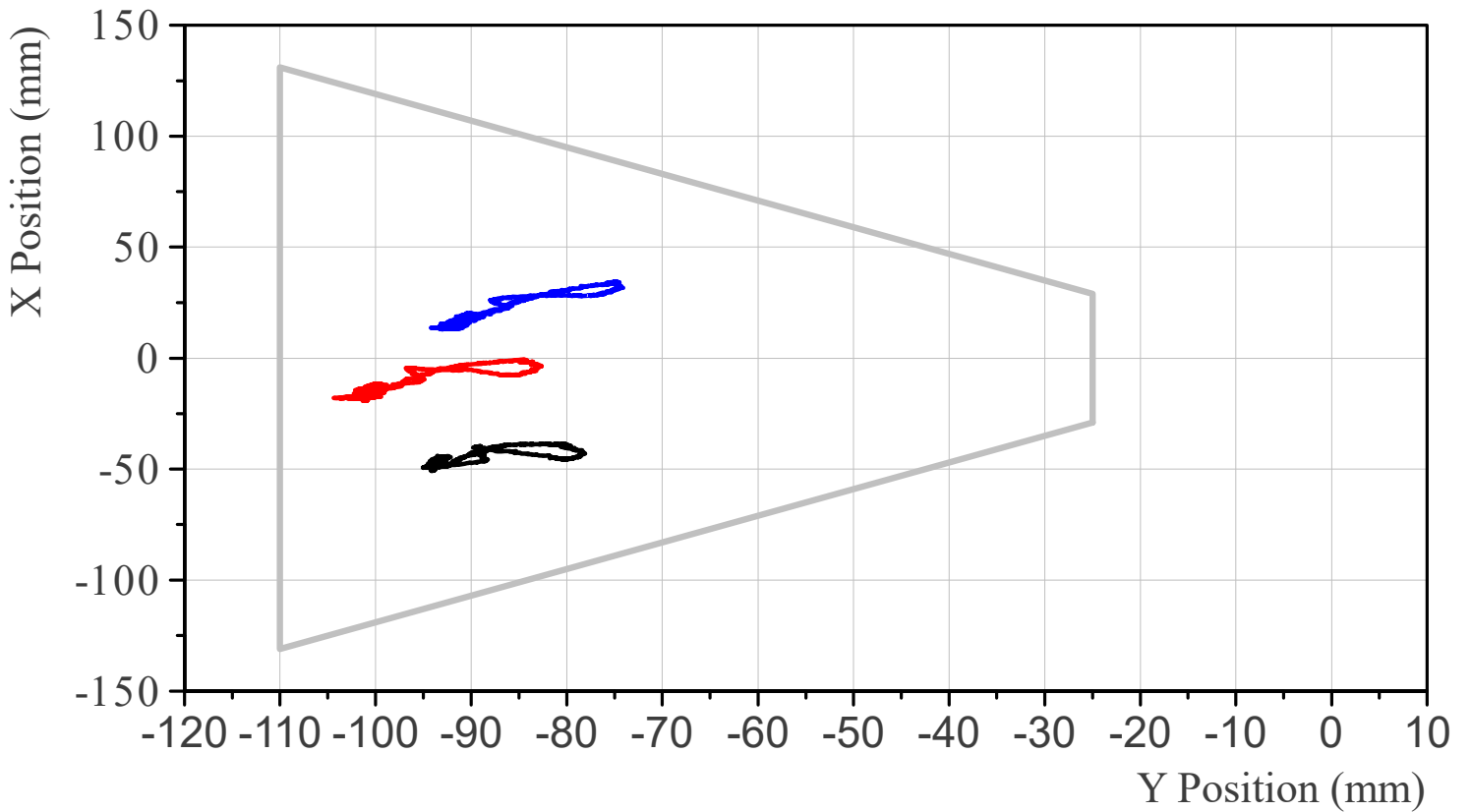
Thorax Rib 2 Absolute Position, Relative to Thorax Rib 1 Origin



Rear LED Middle LED Front LED

RibEye Measurement Range Plot

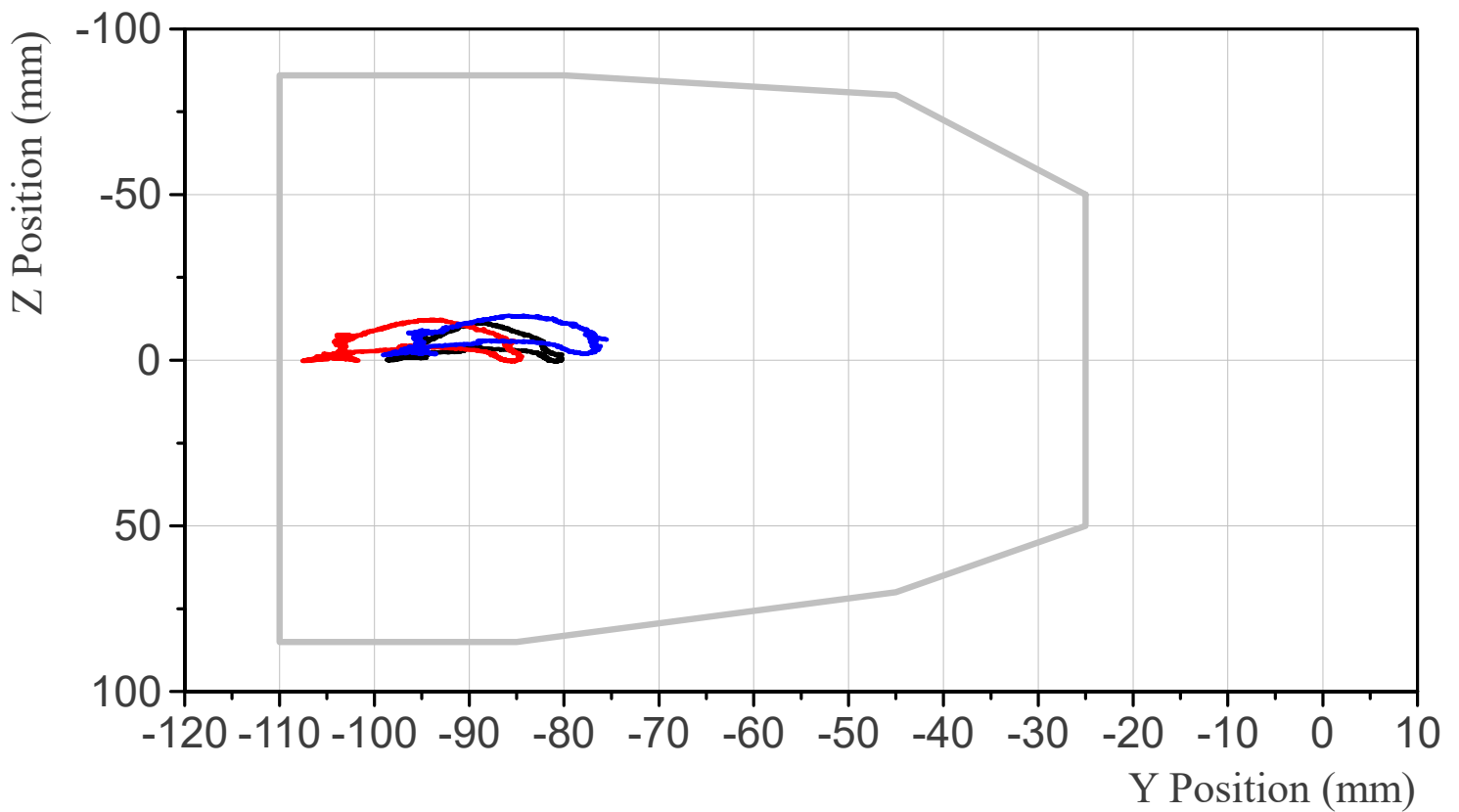
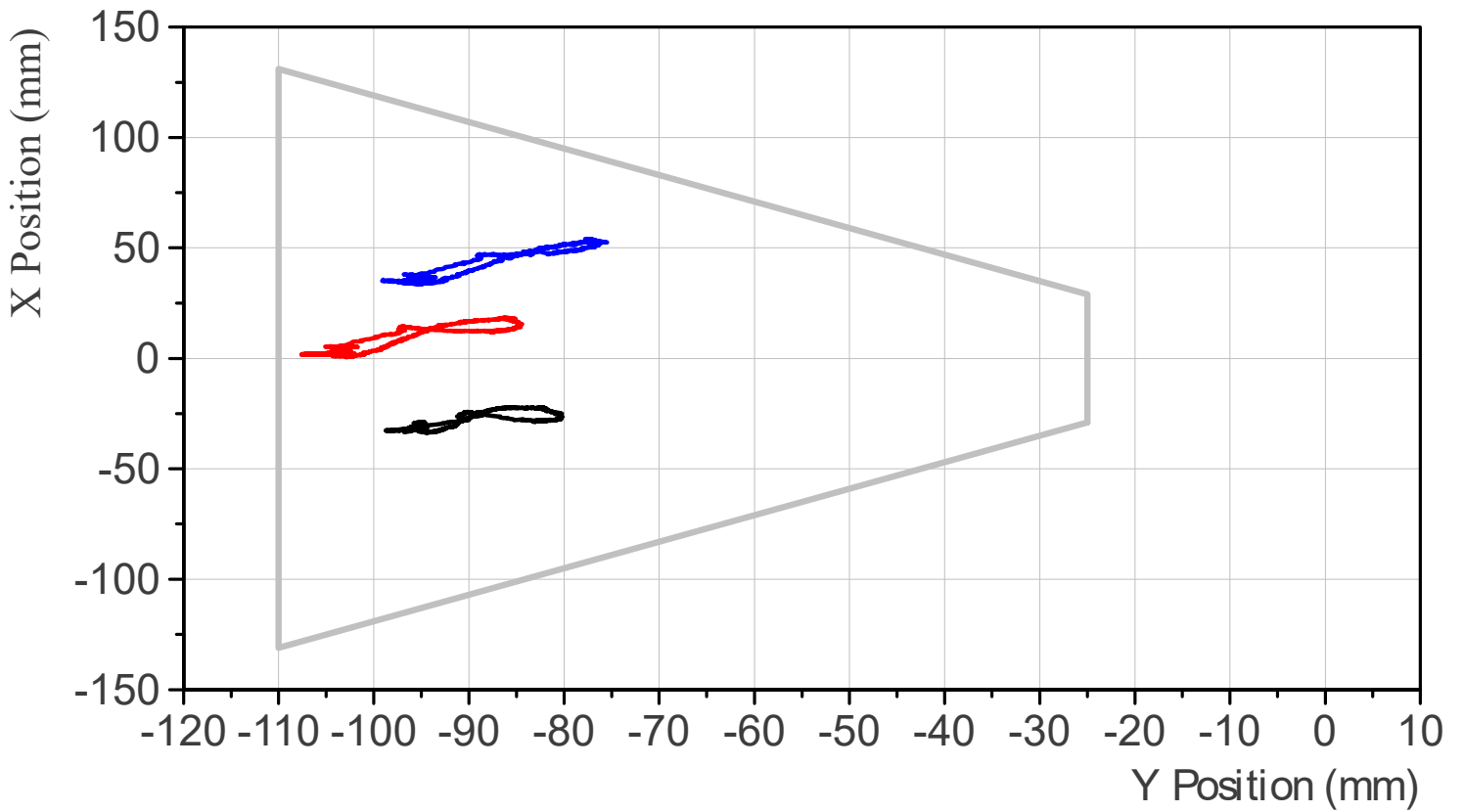
Thorax Rib 3, Absolute Position, Relative to Abdomen Rib 1 Origin



Rear LED Middle LED Front LED

RibEye Measurement Range Plot

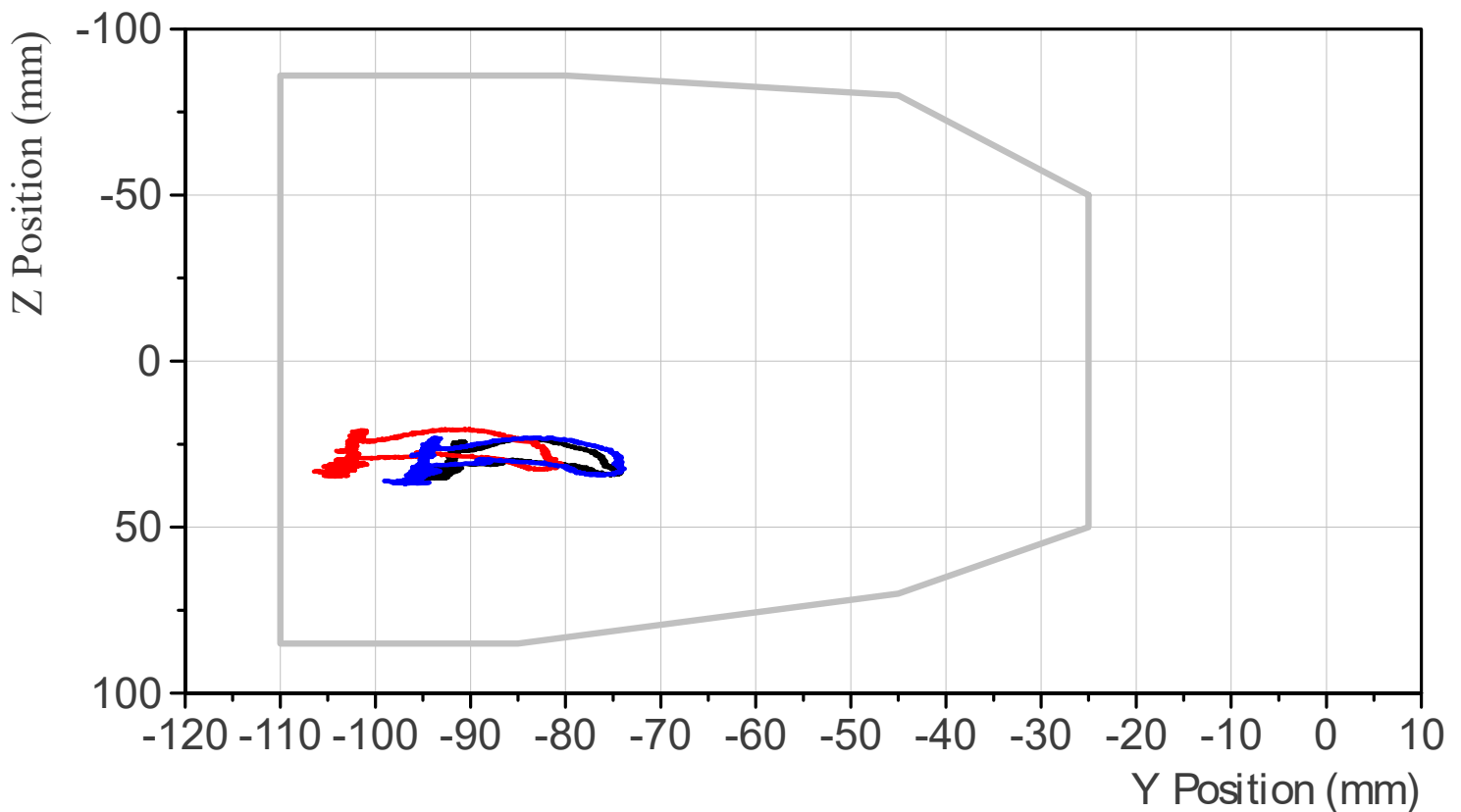
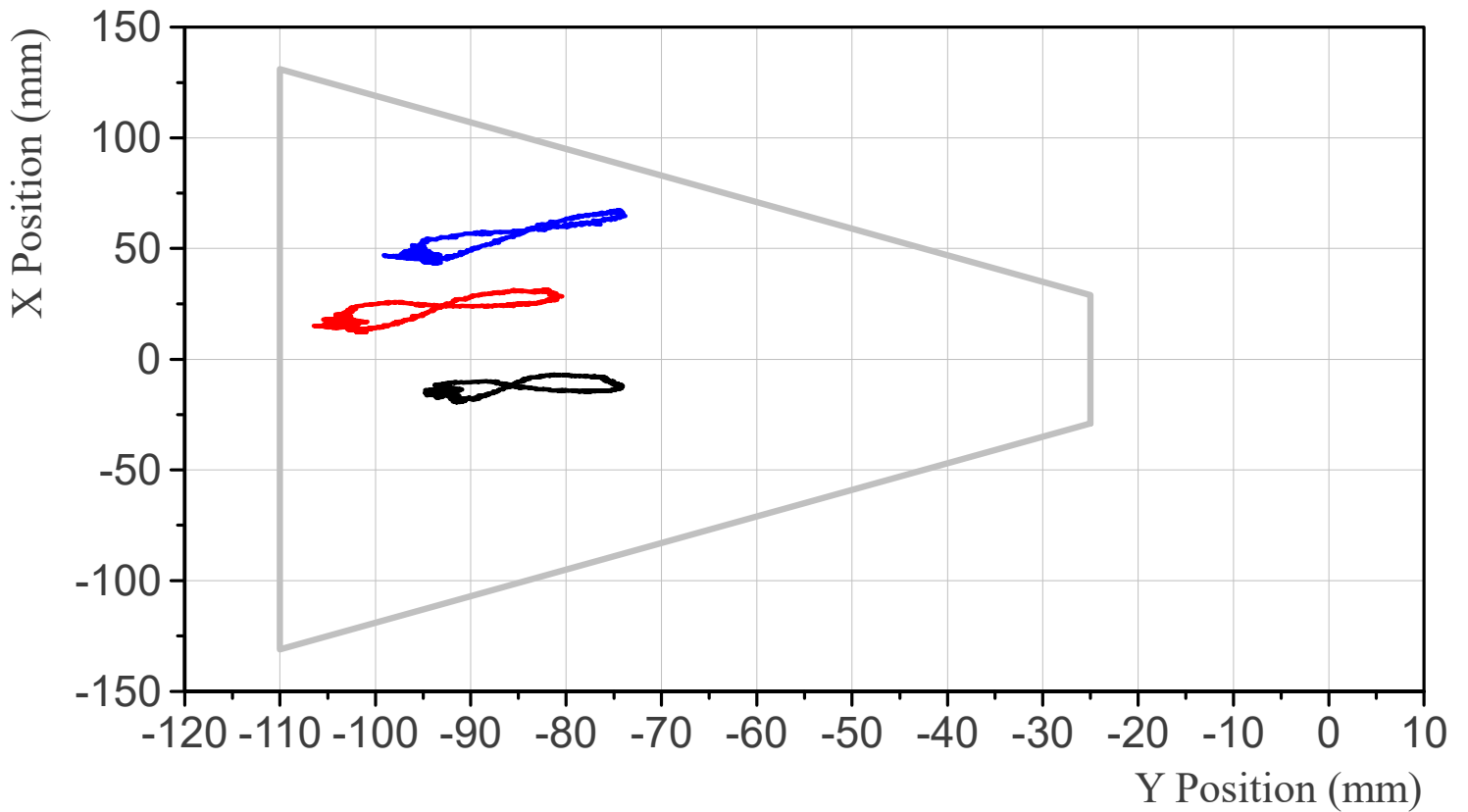
Abdomen Rib 1 Absolute Position, Relative to Abdomen Rib 1 Origin



Rear LED Middle LED Front LED

RibEye Measurement Range Plot

Abdomen Rib 2 Absolute Position, Relative to Abdomen Rib 1 Origin



Rear LED Middle LED Front LED