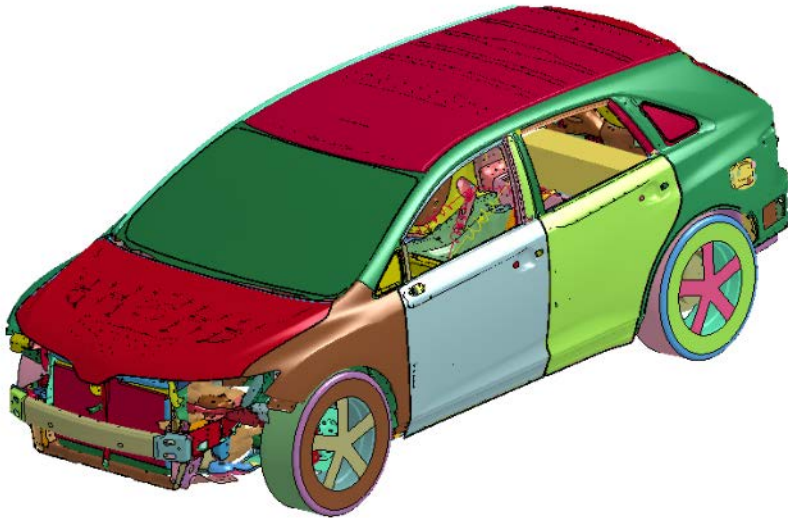




National Crash Analysis Center

2010 Toyota Venza (Baseline BL) FE Model Validation, Trend & Robustness Study

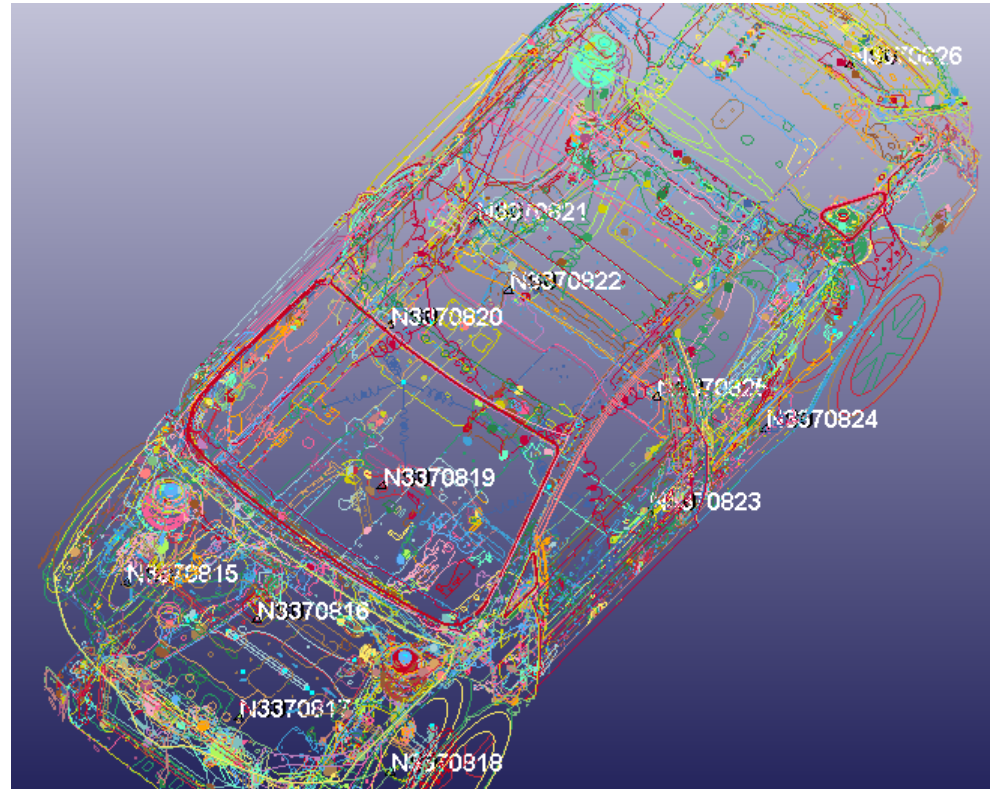
FE Model Information



File Name: Venza_BL_V1c.key	
Total Number of Parts	1143
Total Number of Elements	1389892
Total Number of Nodes	1374798
Total Number of Shell Elements	1292715
Total Number of Solid Elements	97082
Total Number of Beam & Discrete Elements	95

Accelerometers

3370815	BRAKE_CALIPER_RH
3370816	ENG_TOP
3370817	ENG_BOTTOM
3370818	BRAKE_CALIPER_LH
3370819	IP_CENTER
3370820	BPLR_BOTTOM_INNER_RH
3370821	SIDE ROCKER REAR RH
3370822	REAR SEAT XMBR RH
3370823	BPLR_BOTTOM_INNER_LH
3370824	SIDE_ROCKER_REAR_LH
3370825	REAR SEAT XMBR LH
3370826	REAR TRUNK CENTER

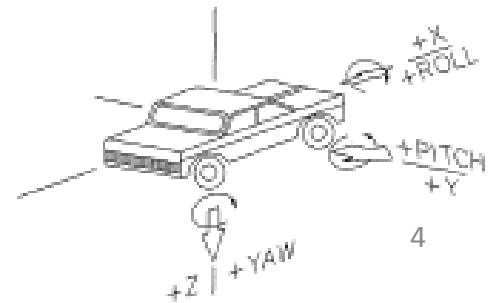


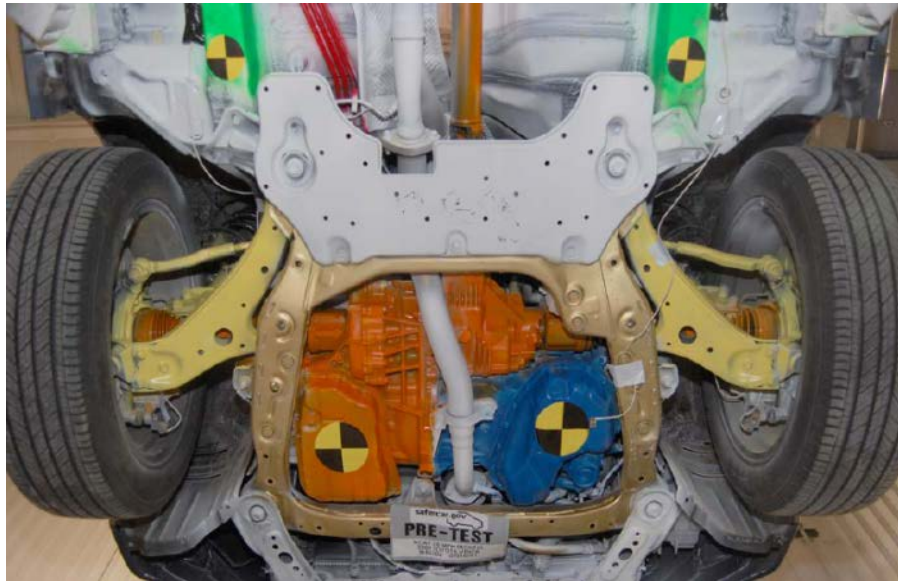
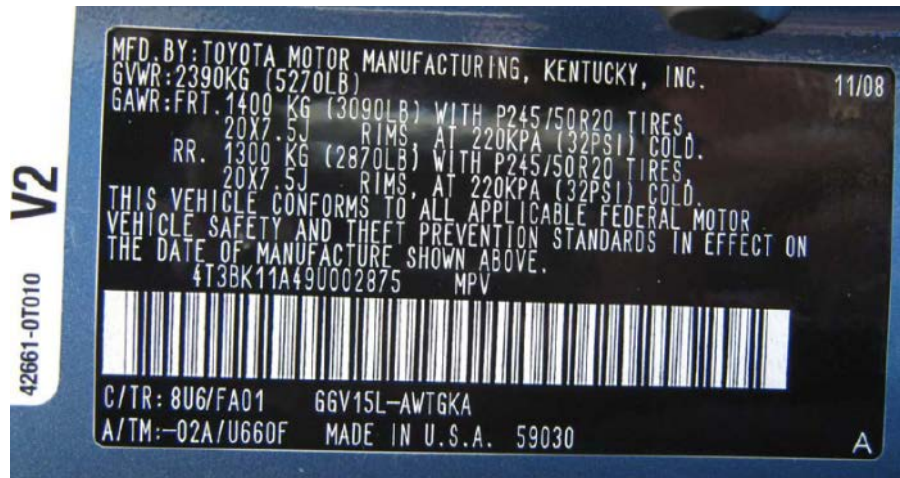
Vehicle Comparisons

	FE Model	NCAP Test 6601 (2 HIII 50 th)	IIHS ODB Test CEF0903	FMVSS 208 Test 7056 (2 HIII 5 th)	VRTC Test 40 kmph (1 HIII 5 th)
Weight (Kg)	1767+38	2074	1961	1840	1786
Pitch Inertia (Kg-m ²)	3102				
Yaw Inertia (Kg-m ²)	3444				
Roll Inertia (Kg-m ²)	694				
Vehicle CG 'X' (mm)	1205	1258			1226
Tire	P245/55R19	P245/50R20	P245/50R20	P245/55R19	P245/55R19
Engine	2.7 liter 4 cyl	3.5 liter 6 cyl	3.5 liter 6 cyl	2.7 liter 4 cyl	2.7 liter 4 cyl

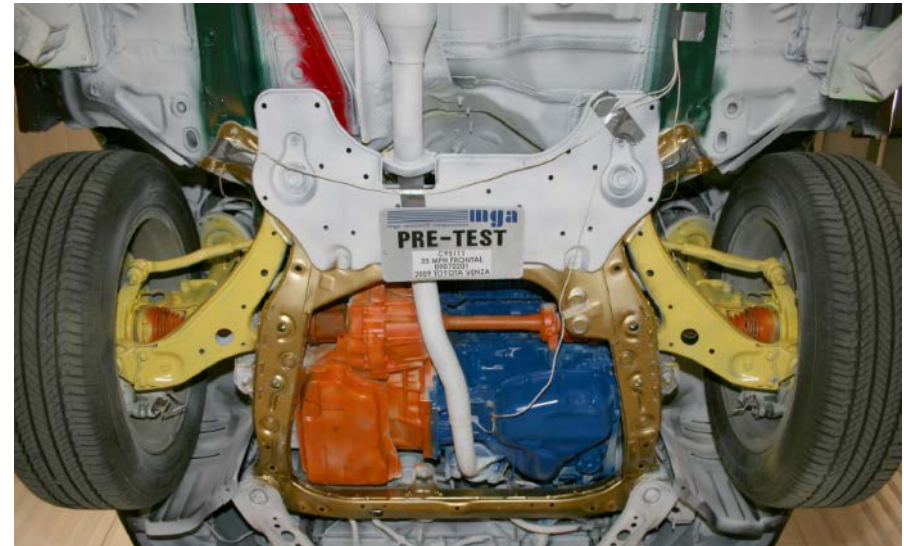
Full Scale Crash tests

- US NCAP Test 6601 (3.5 liter 6 cyl AWD) (HIII 50th)
- FMVSS 208 Test 7056 (2.7 liter 4 cyl FWD) @ 56 kmph (HIII 5th)
- 40 kmph test conducted at VRTC (HIII 5th)



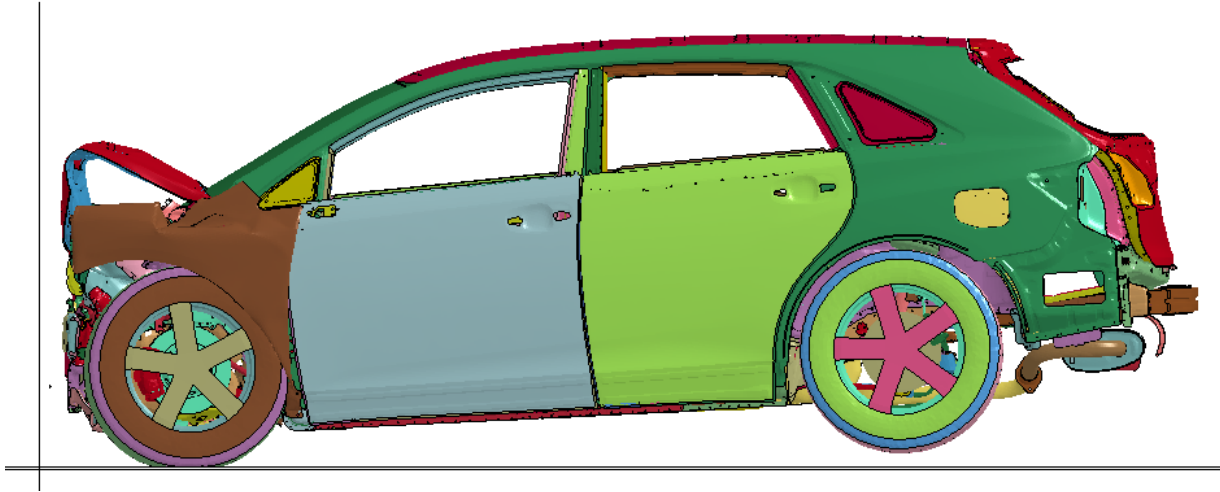


3.5 liter 6 cylinder AWD

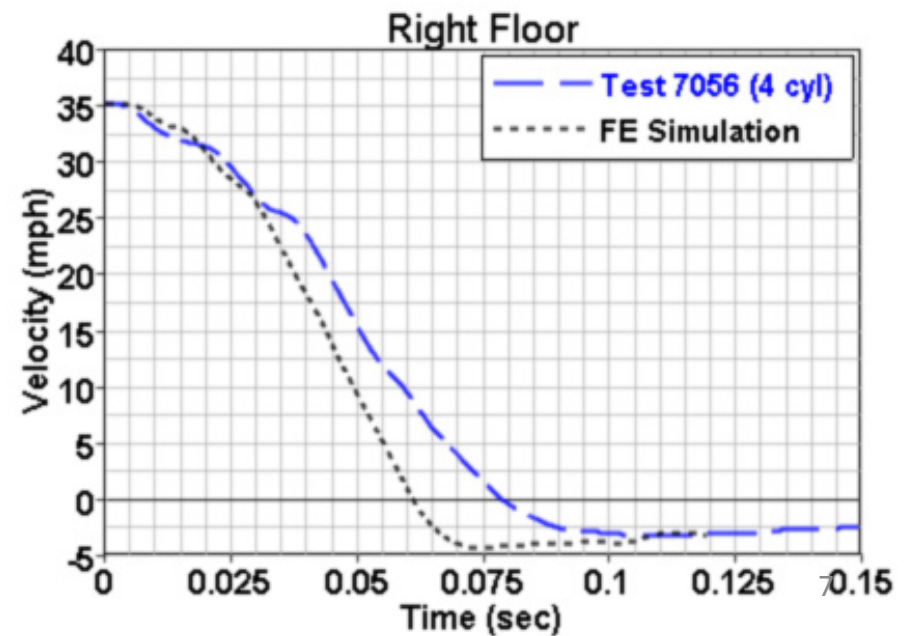
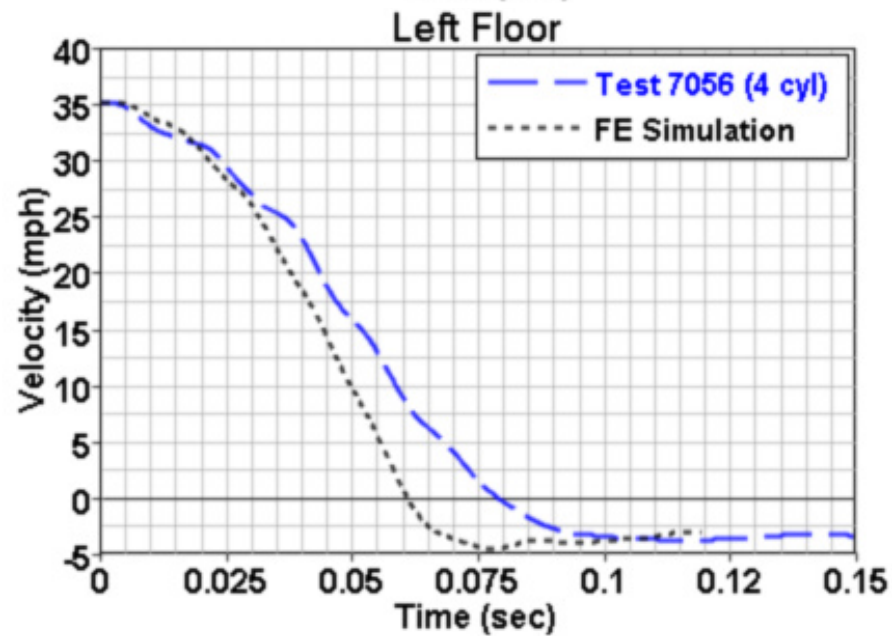
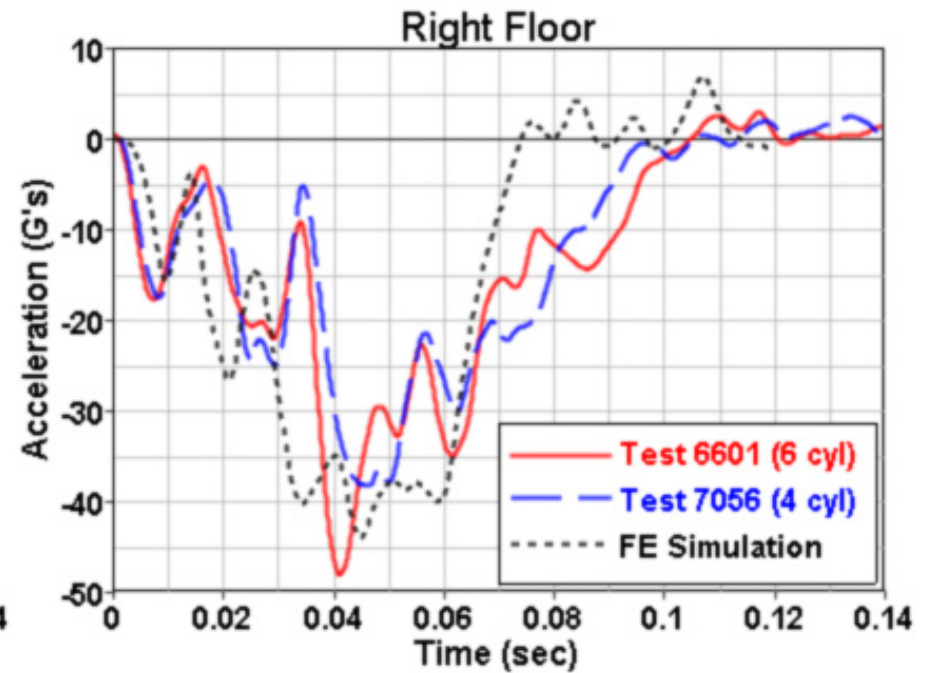
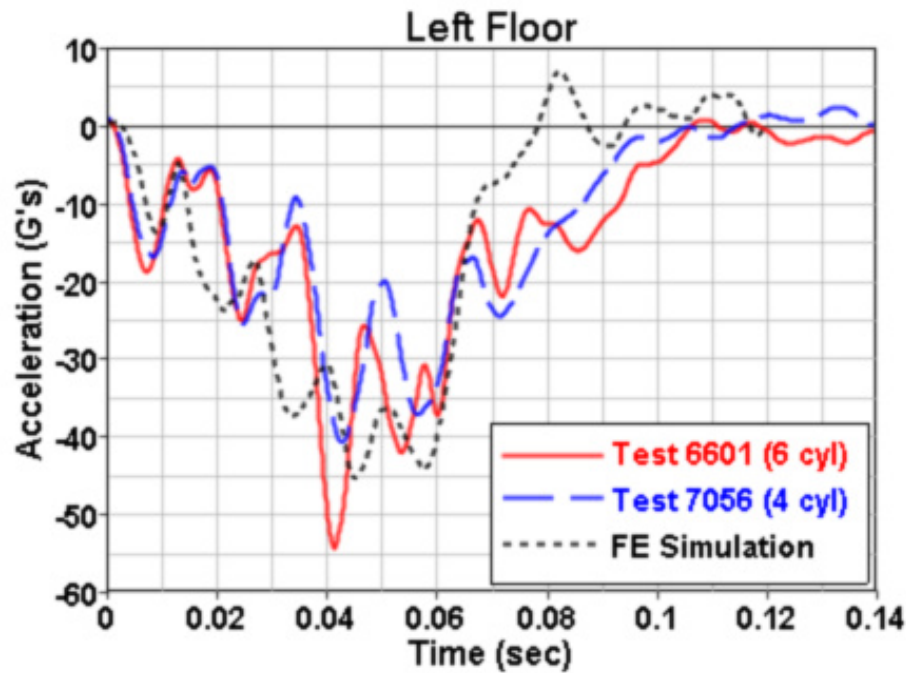


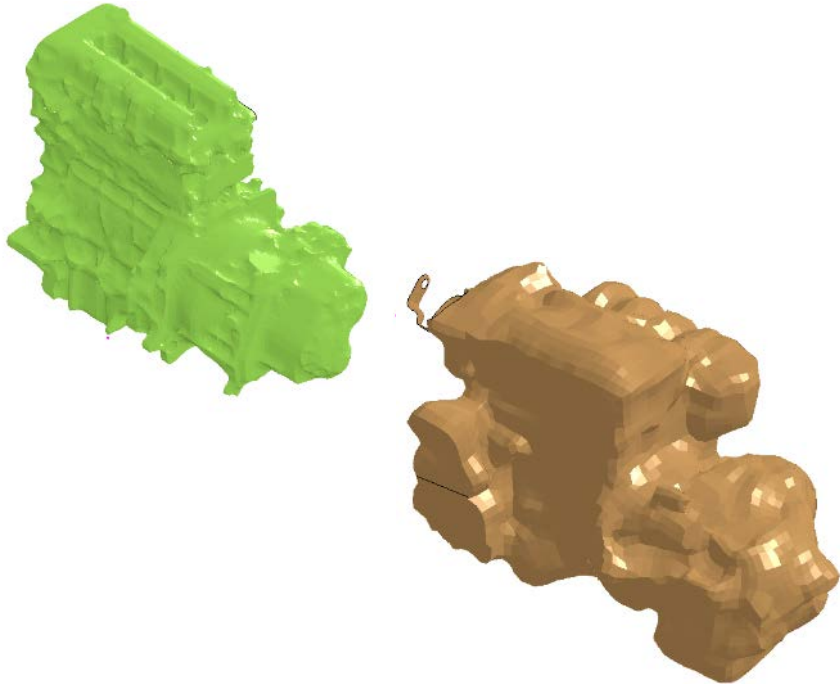
2.7 liter 4 cylinder FWD

Baseline Comparisons



Baseline Results

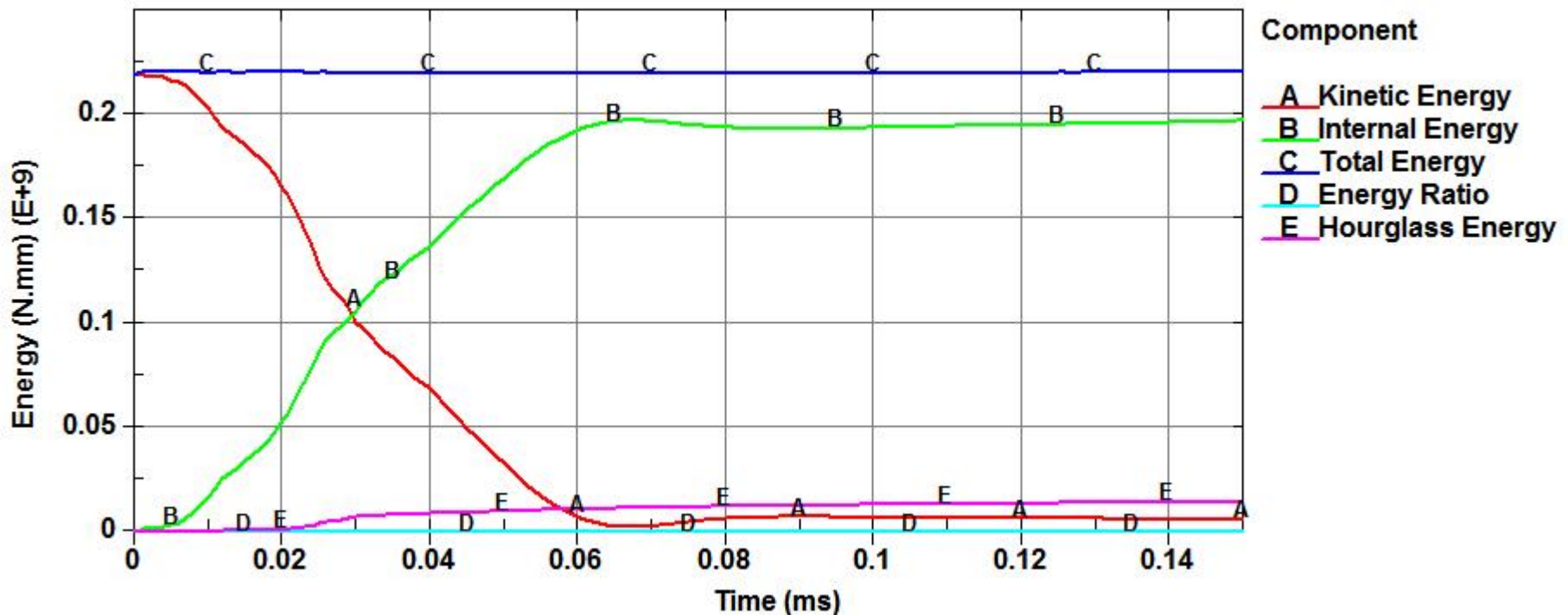




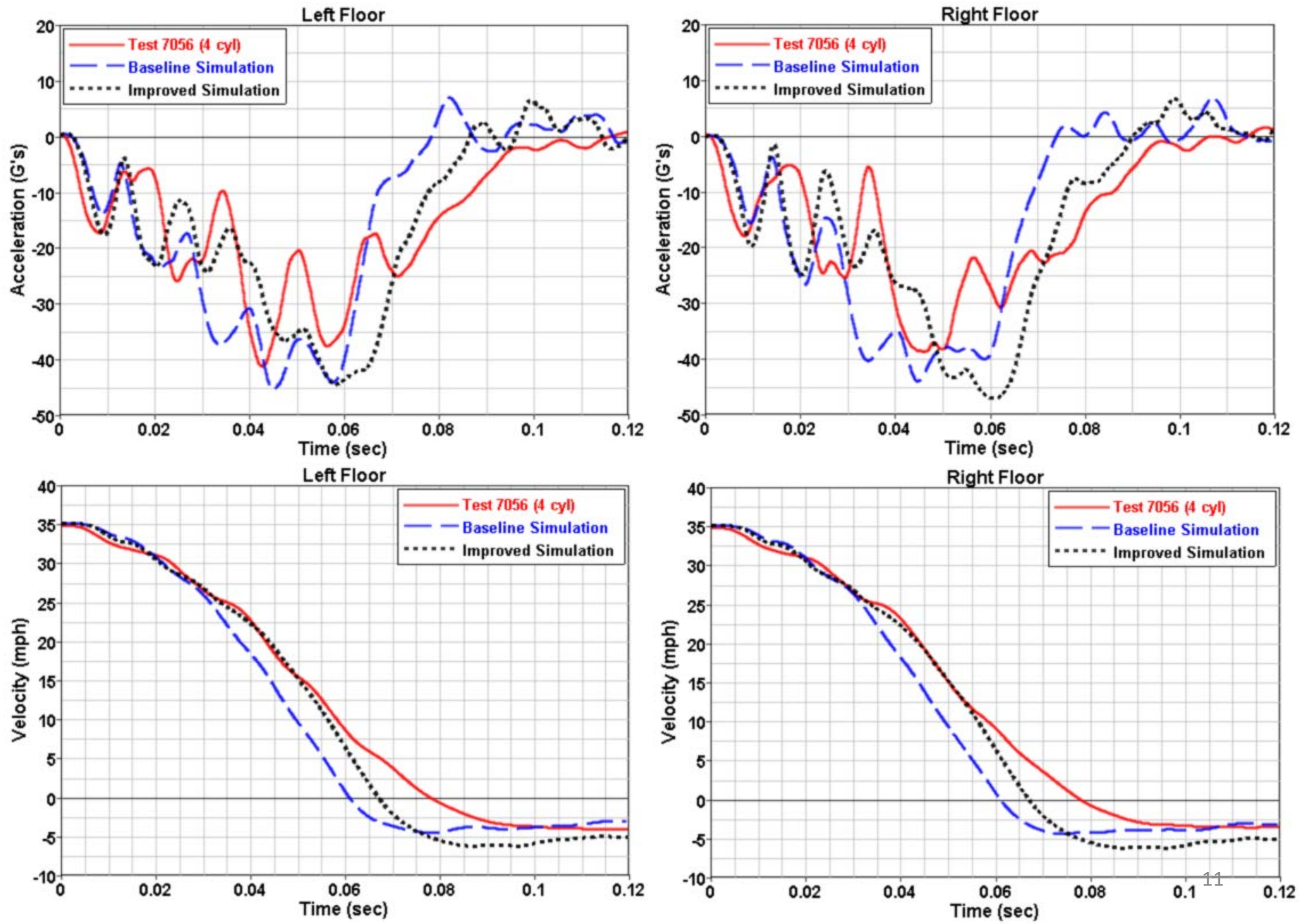
Full Frontal Impact Validation @ 35 mph

Energy Comparison

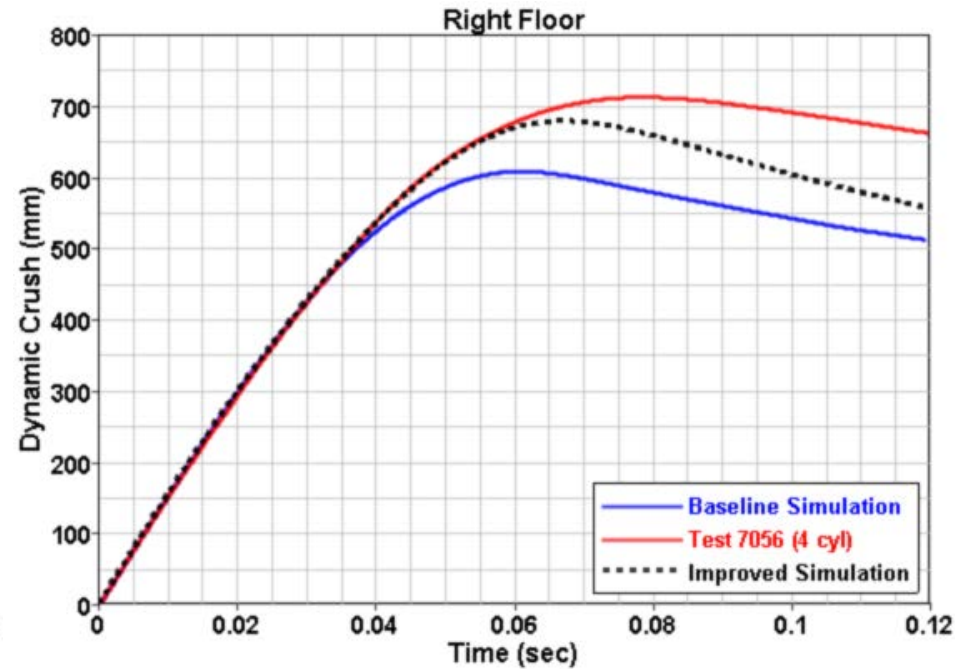
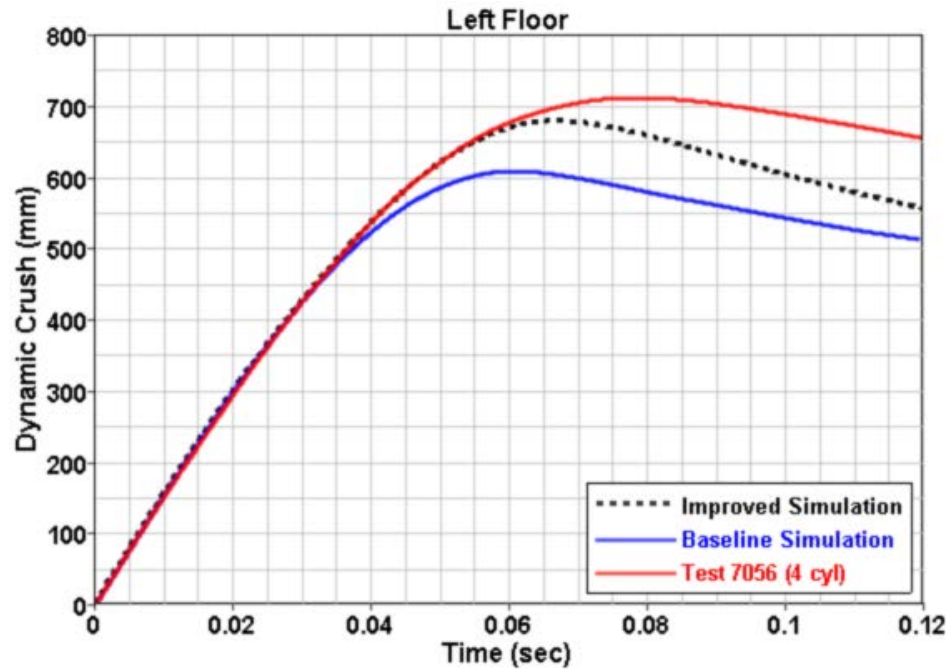
- Energy comparison looks OK
- No energy spikes & total energy remains constant
- Hourglass energy remains low



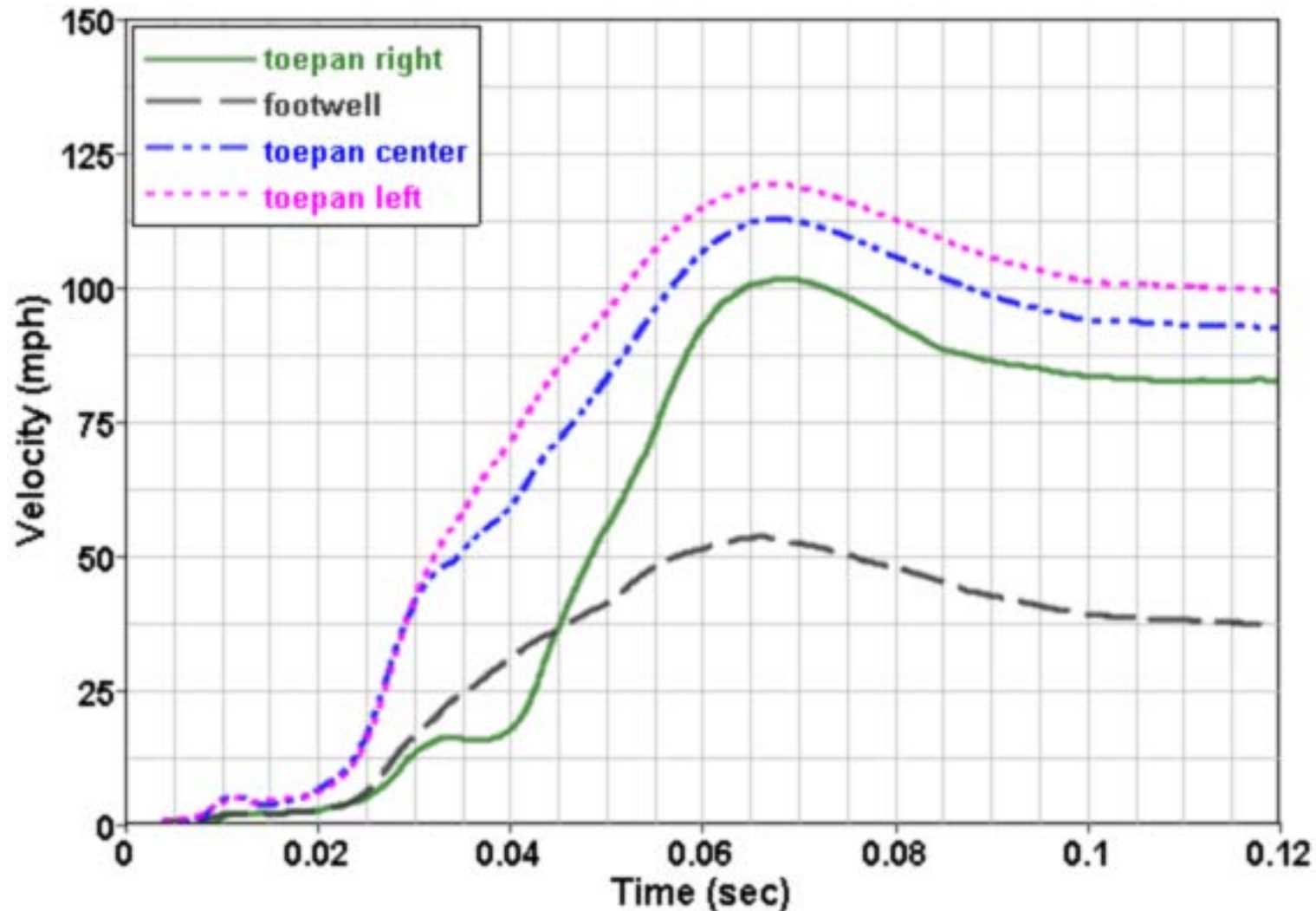
Updated Model Results – Frontal 35 mph



Overall Dynamic Crush – Frontal 35 mph

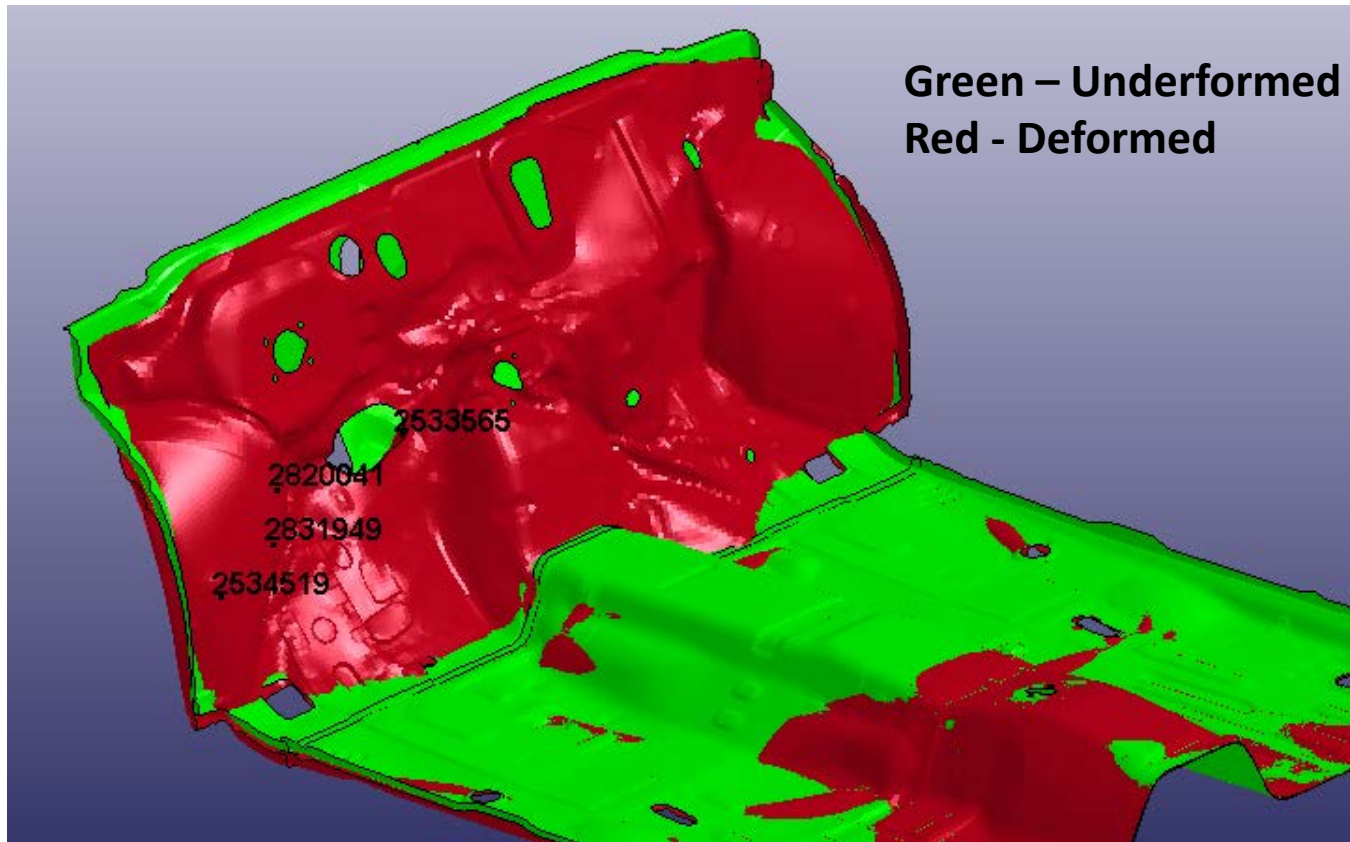


Toeplan Intrusions – 35 mph



Intrusion Comparison – 35 mph

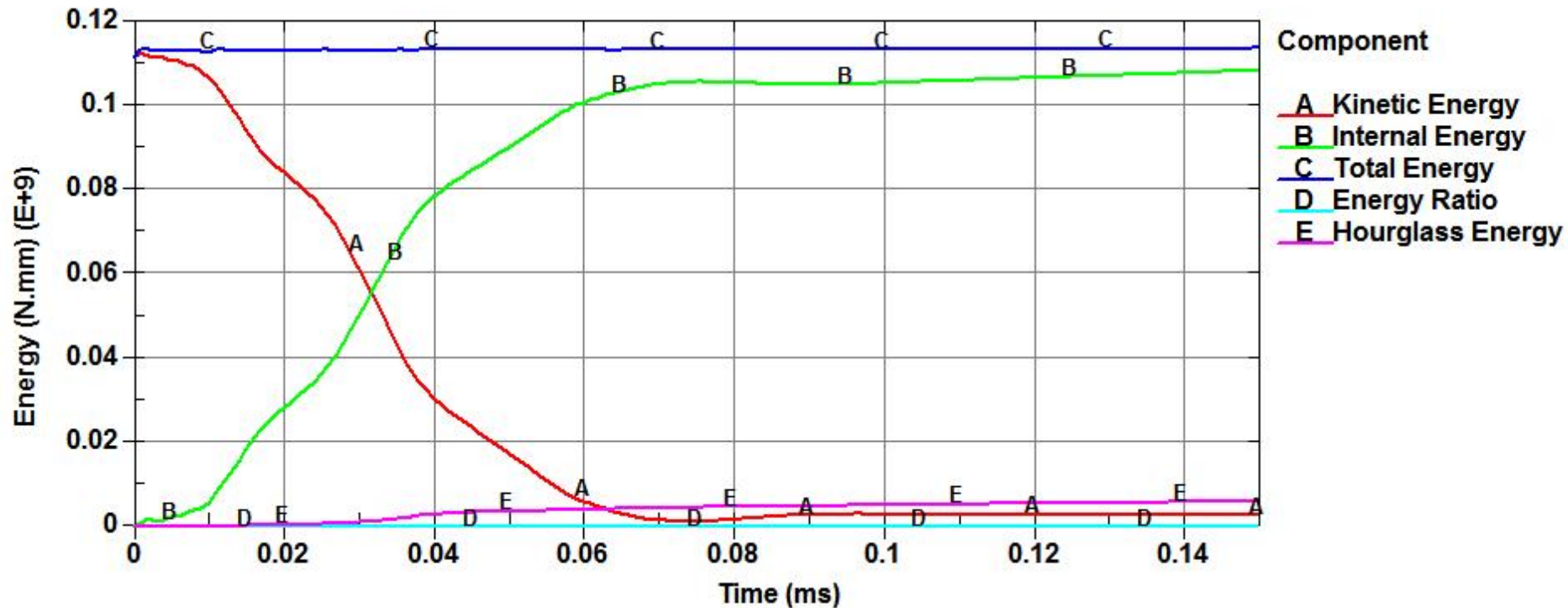
- Intrusion measurements not available in the 208 test
- Peak footwell intrusion in the simulation occurs @ 65 ms
- Hence the slightly stiffer pulse after 65 ms may not majorly influence the occupant injury risks



Full Frontal Impact Validation @ 25 mph

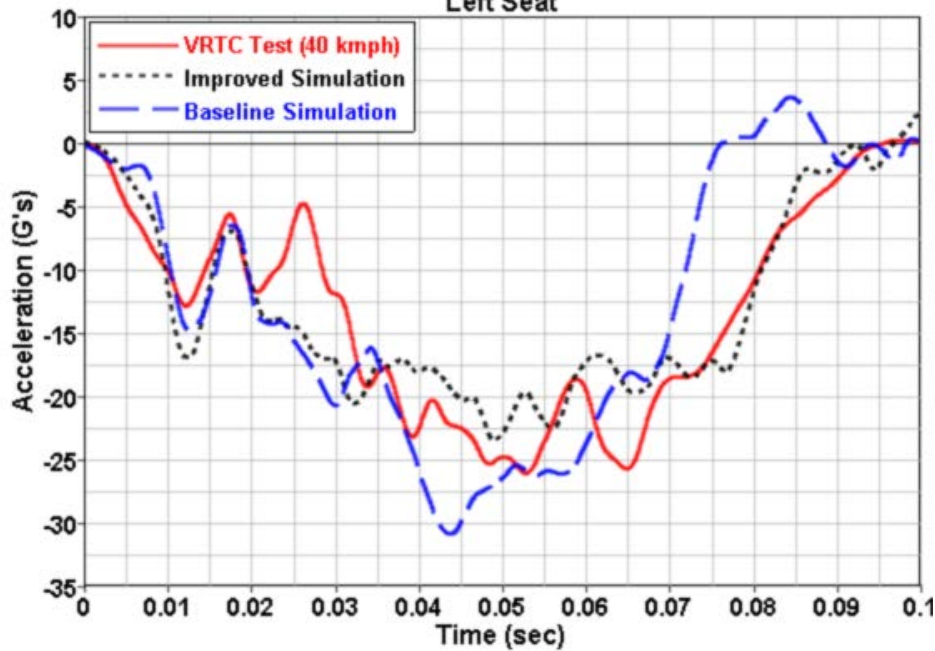
Energy Comparison

- Energy comparison looks OK
- No energy spikes & total energy remains constant
- Hourglass energy remains low

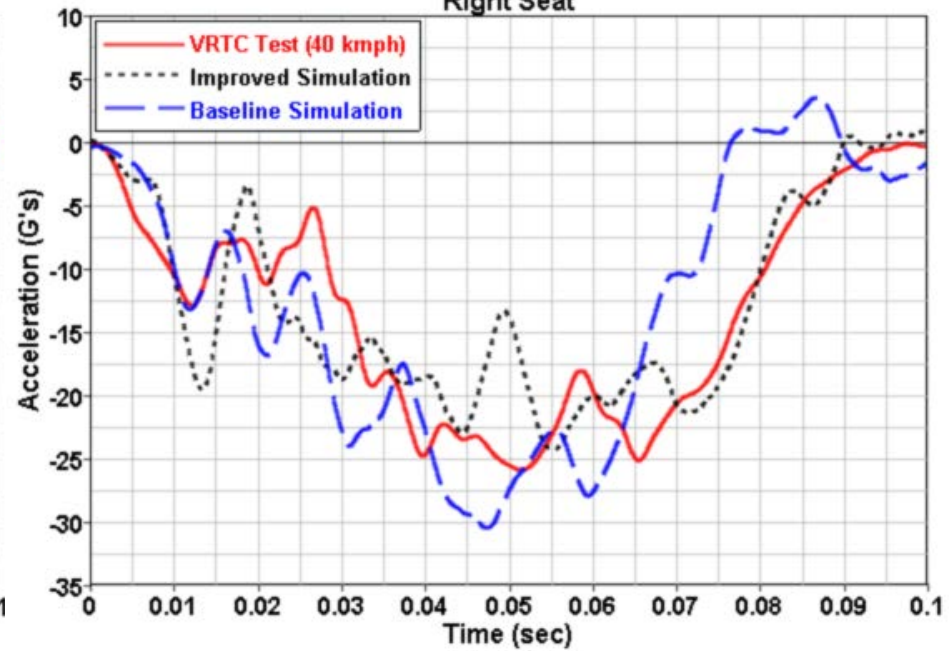


Updated Model Results – Frontal 25 mph

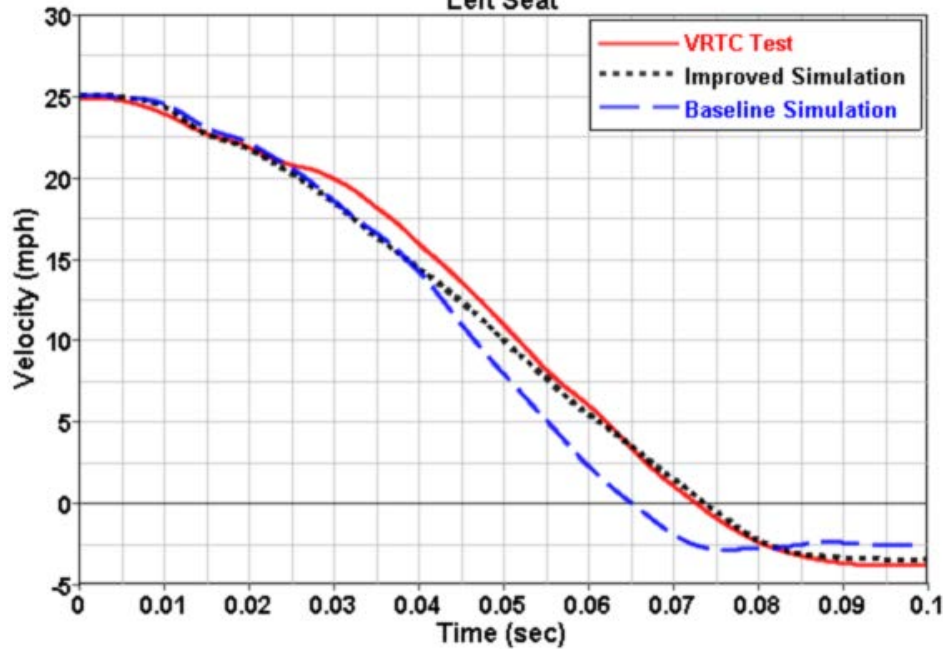
Left Seat



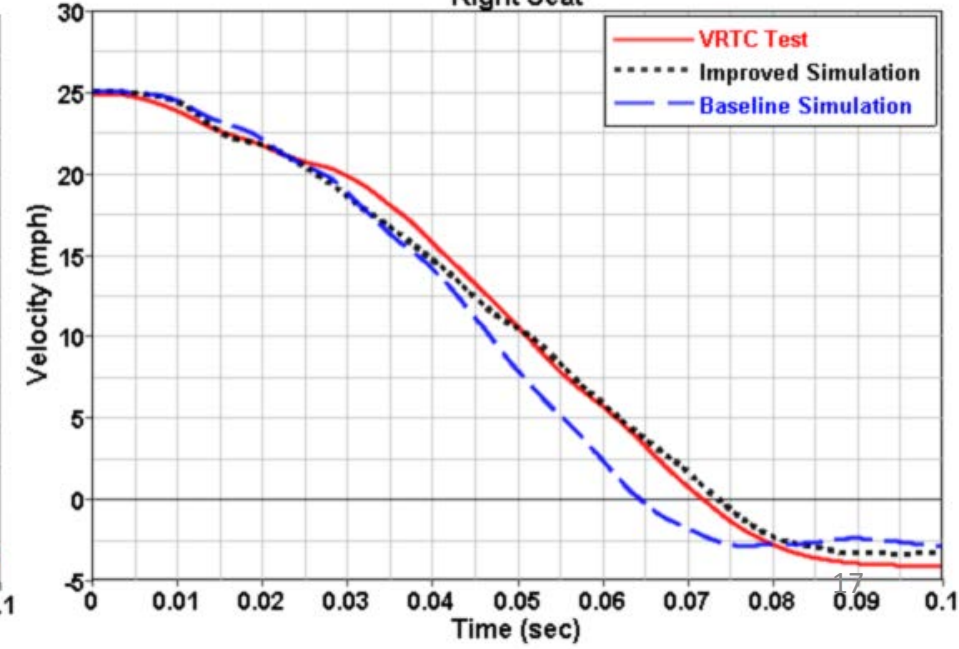
Right Seat



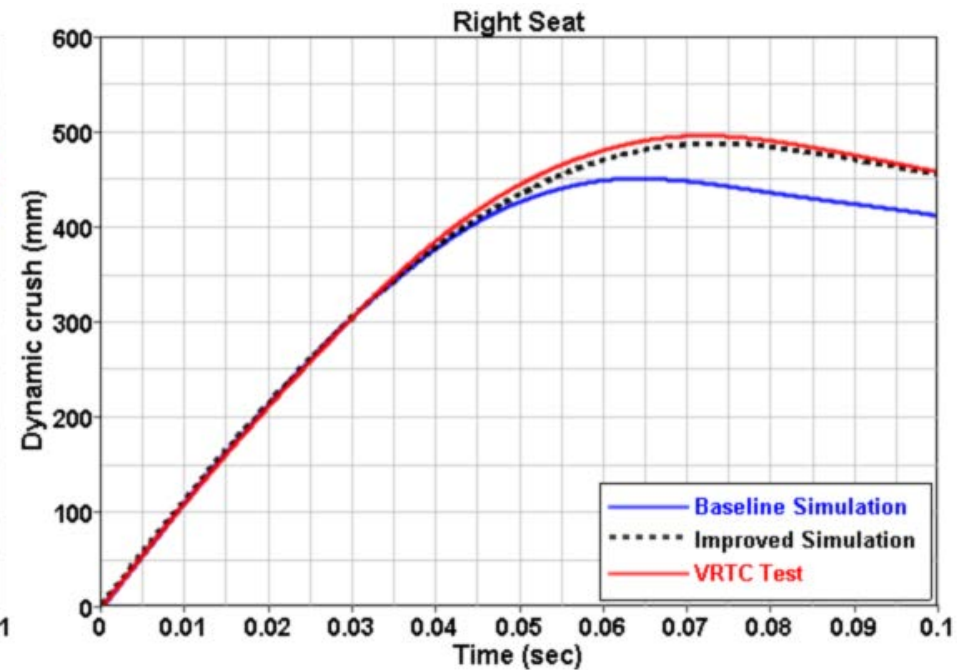
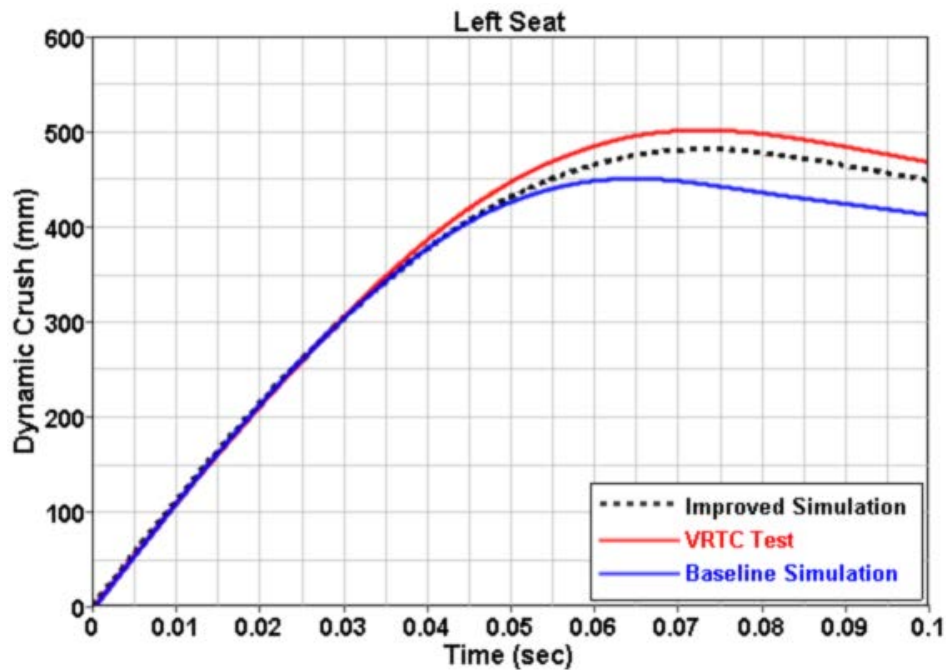
Left Seat



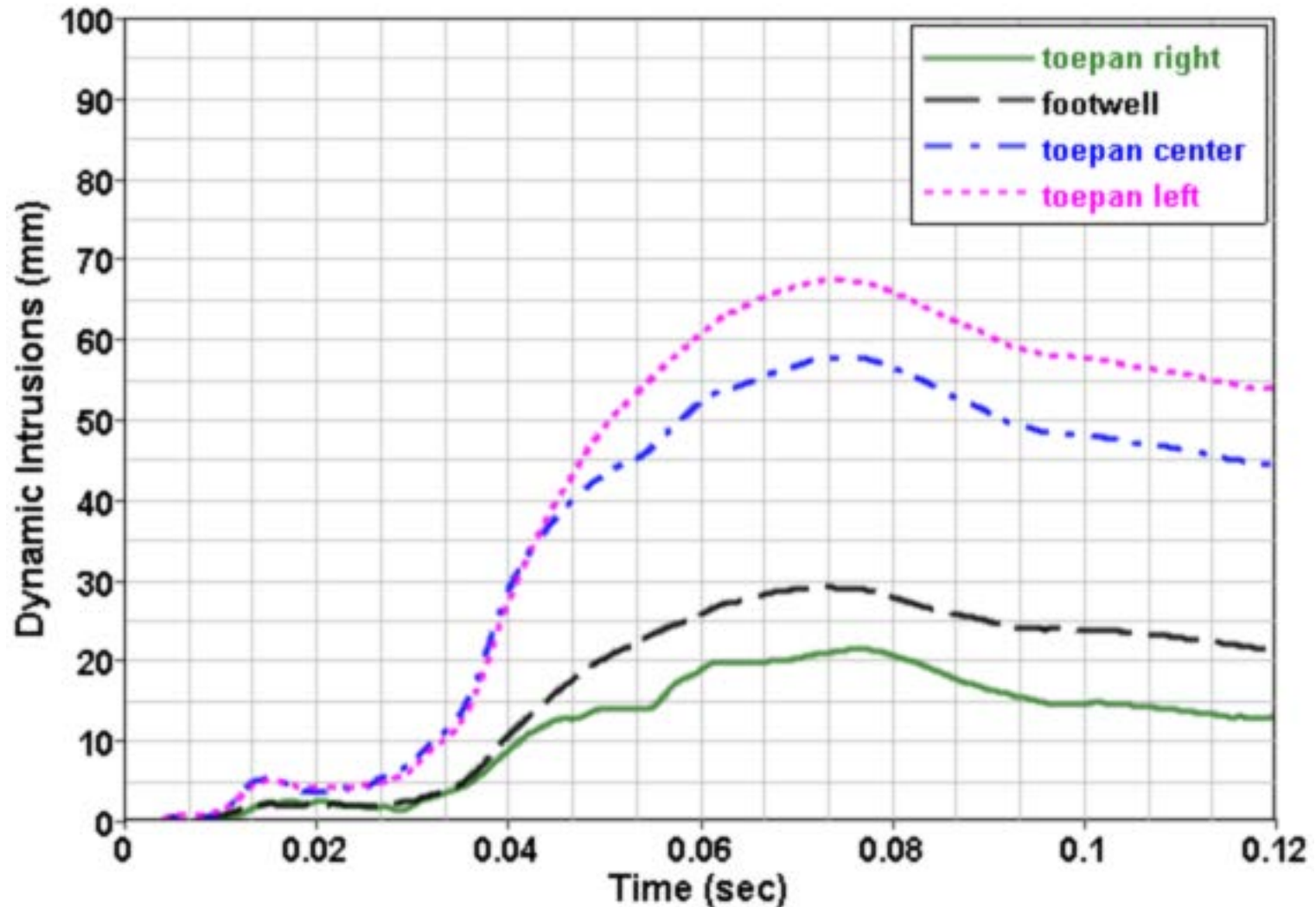
Right Seat



Overall Dynamic Crush – Frontal 25 mph

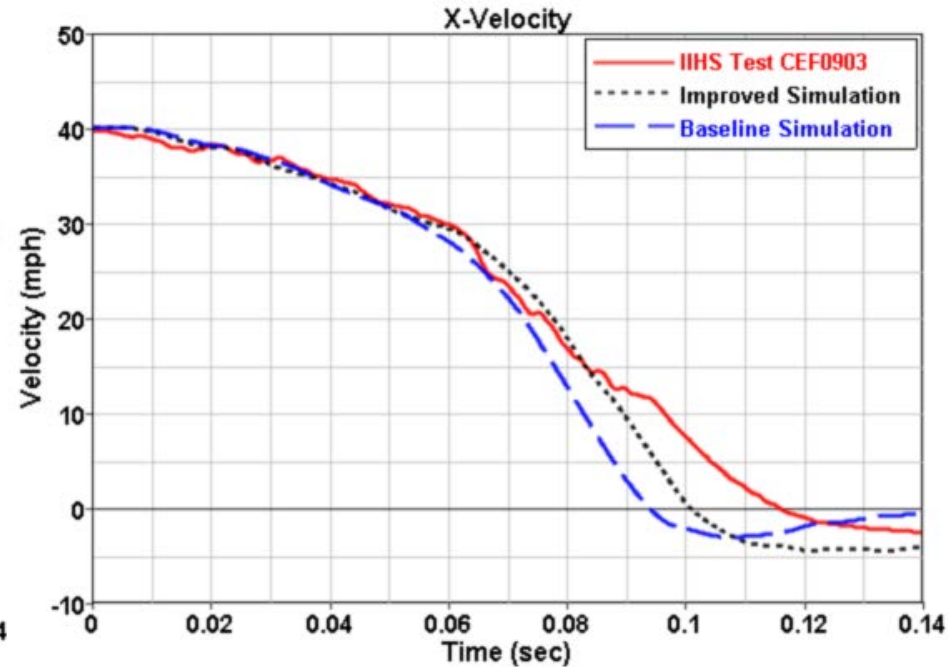
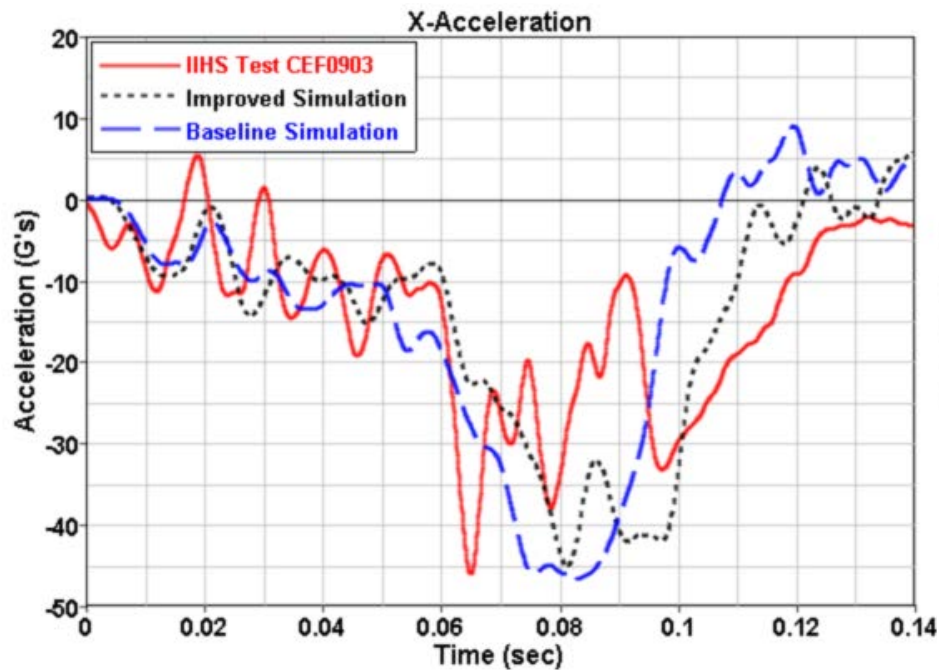


Toeplan Intrusions – 25 mph



40% overlap ODB @ 40 mph

Updated Model Results – 40% overlap ODB 40 mph



BL Venza Robustness & Trend Analysis Simulations

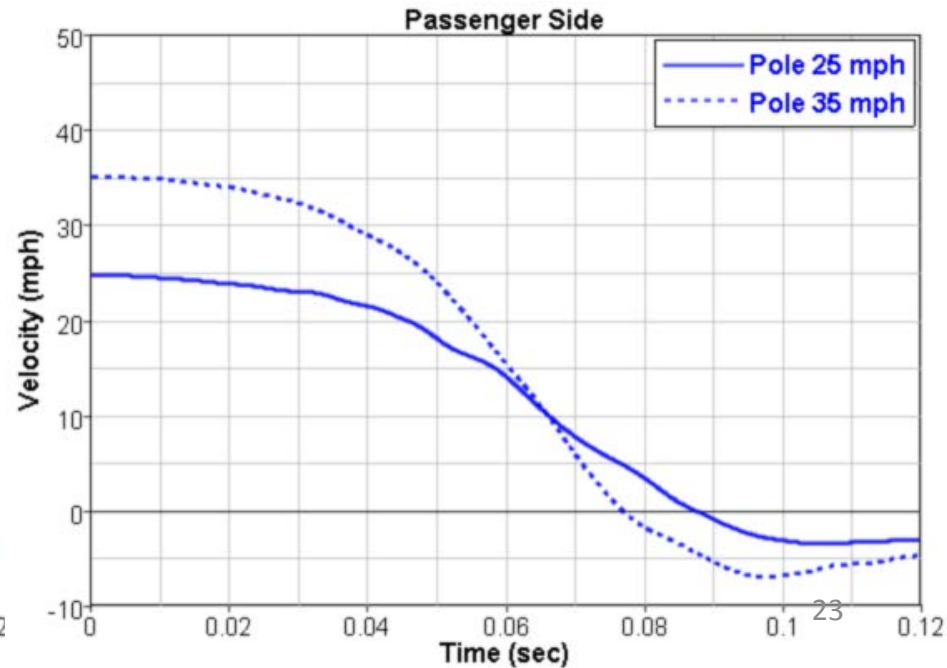
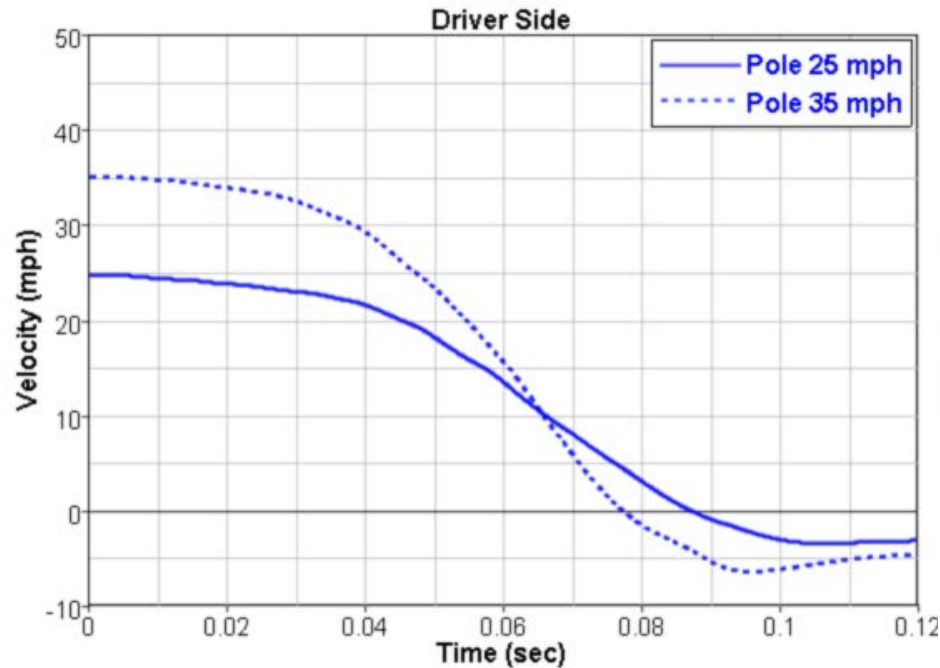
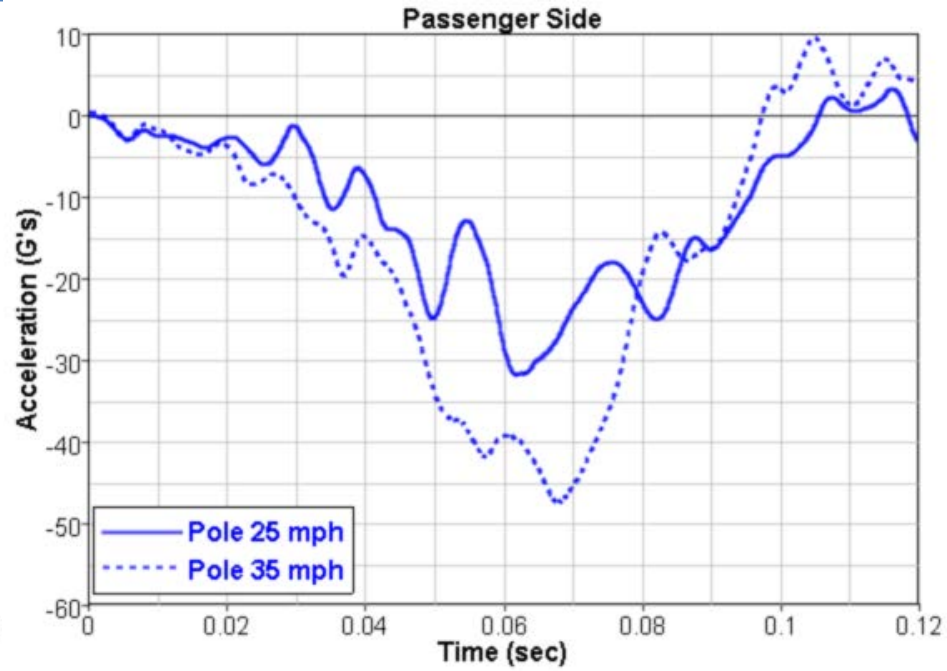
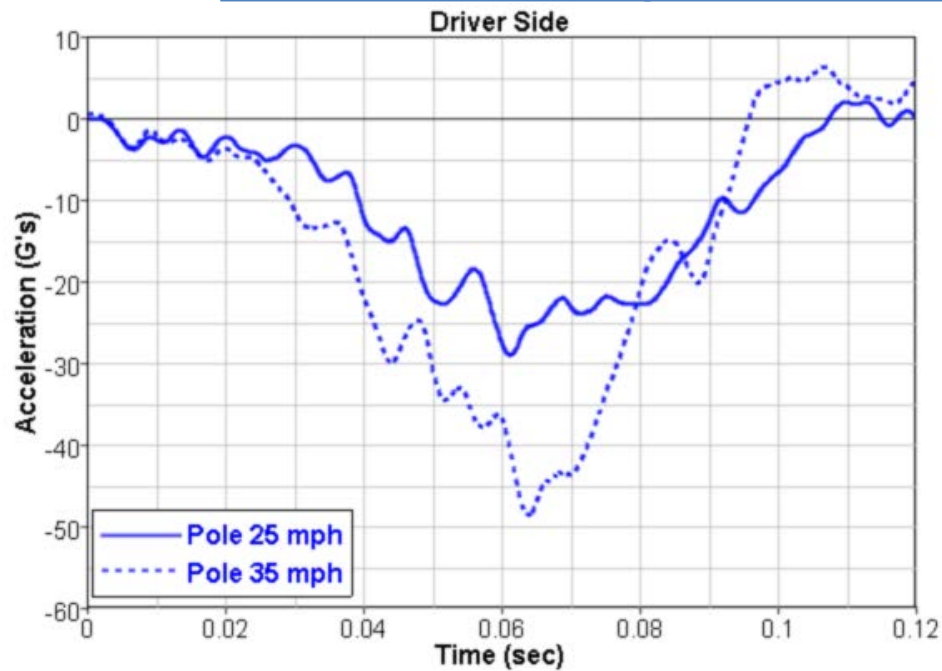
Robustness and Stability Analyses:

- Centerline impact into fixed 10" diameter pole & 35 mph
- 40% and Full overlap v-t-v impact into Silverado @ 35 mph

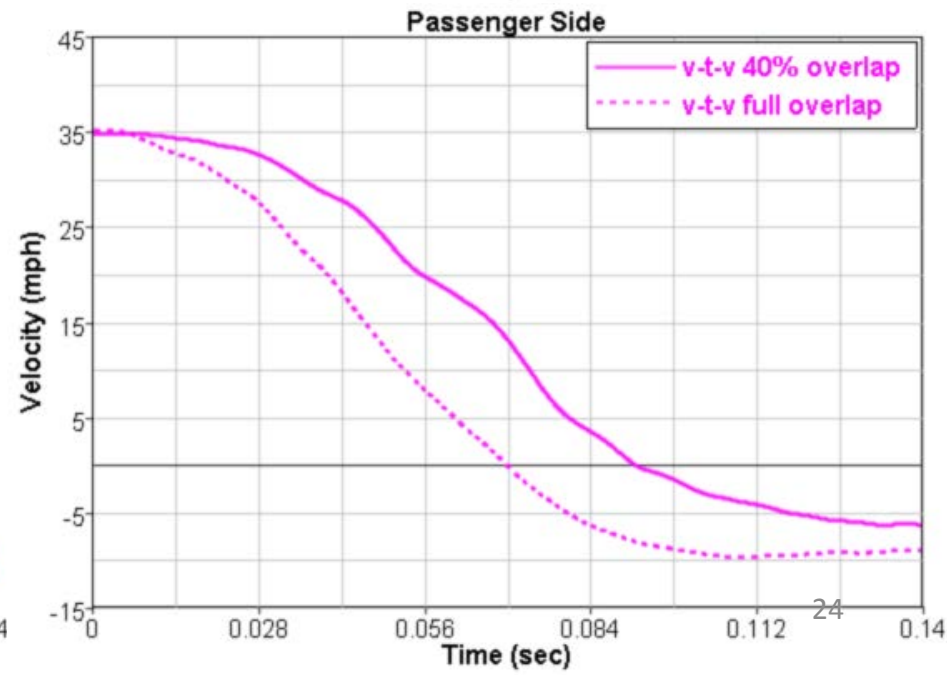
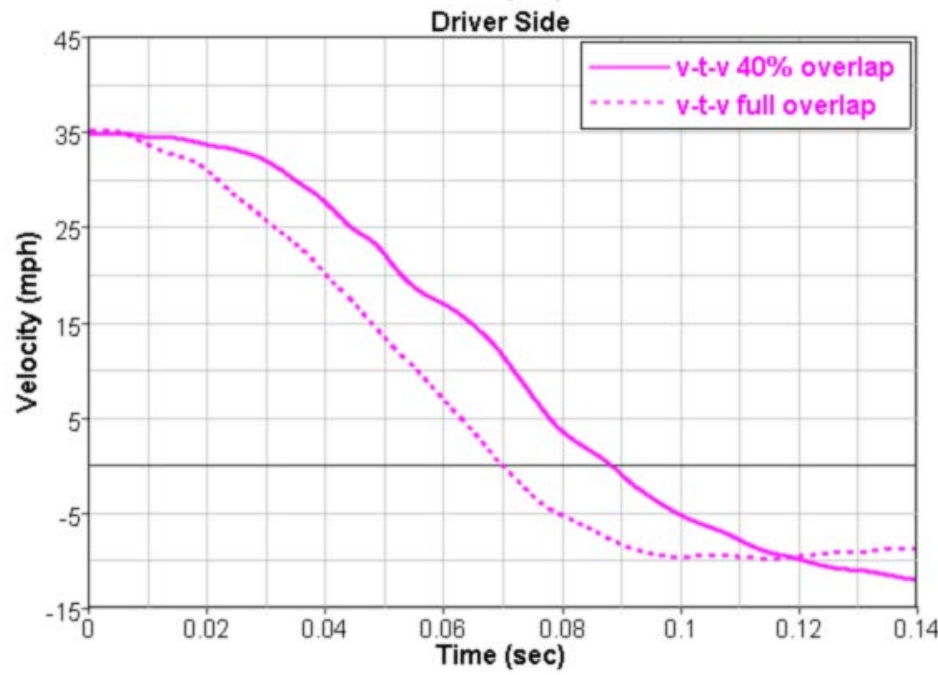
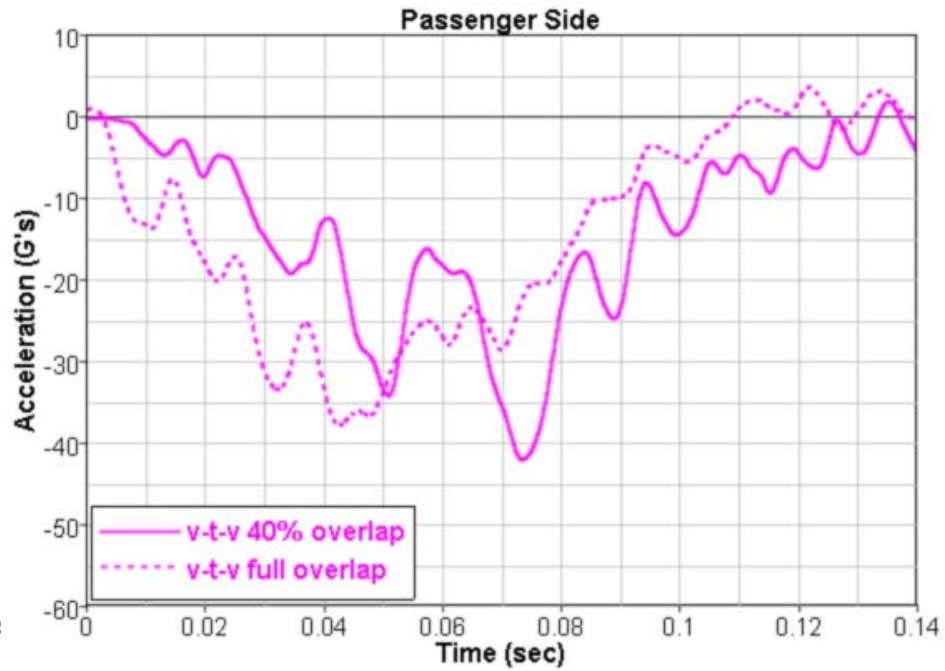
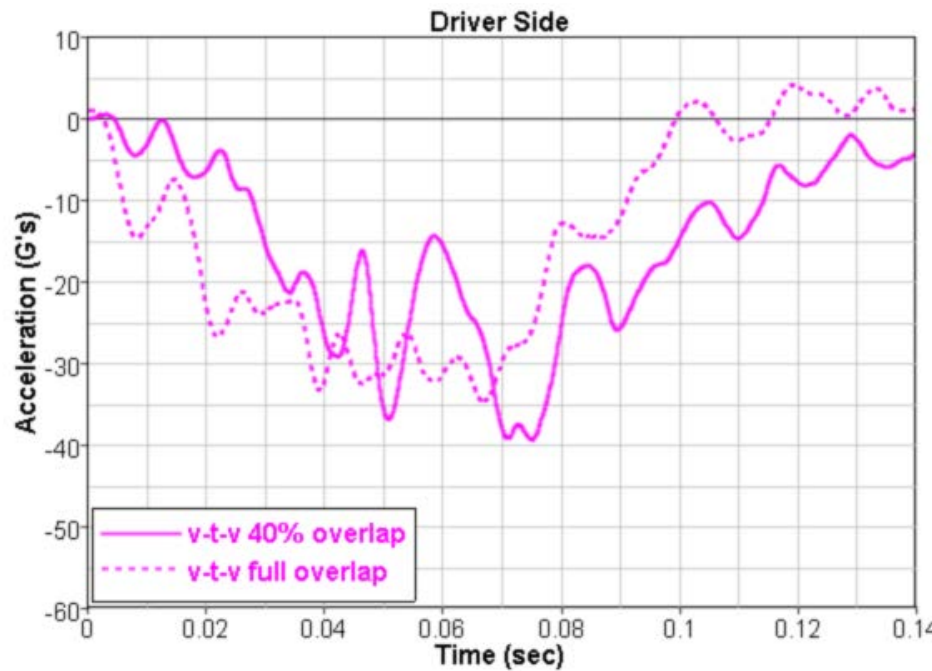
Trend Analysis:

- Full frontal impact into fixed barrier: 35 mph & 25 mph
- 40% overlap impact into deformable barrier: 40 mph & 25 mph
- Centerline impact into fixed 10" diameter pole: 35 mph & 25 mph

Centerline Impact into 10" pole @ 25 & 35 mph

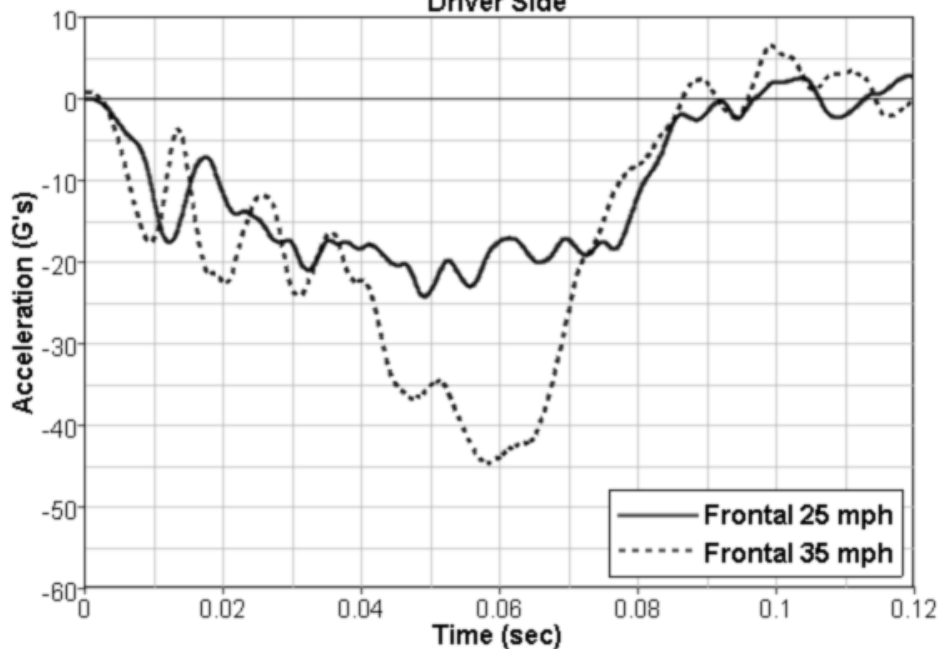


V-t-V impact @ 35 mph with Silverado

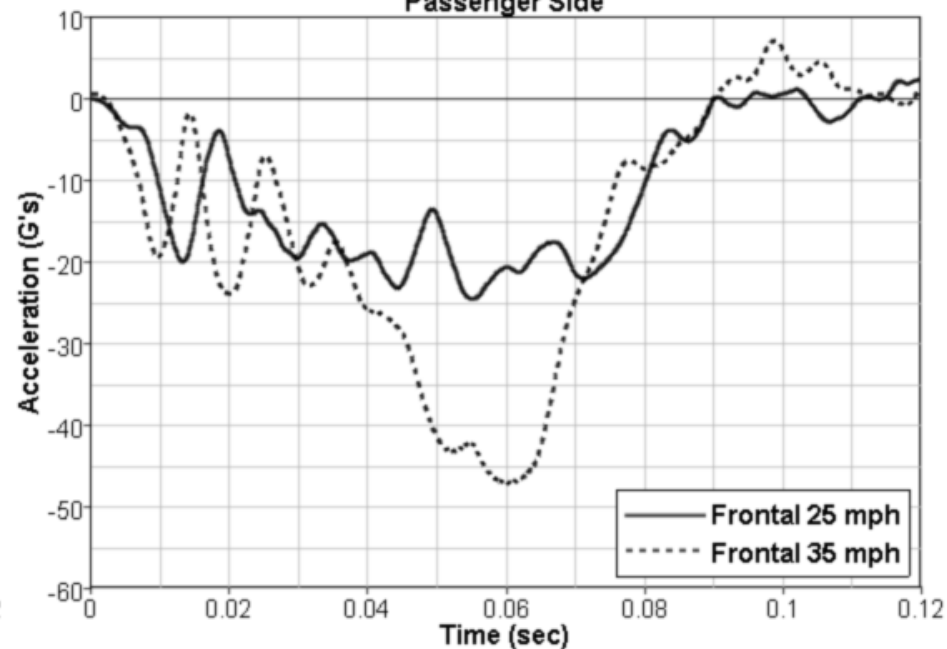


Full Frontal Impact – 25 & 35 mph

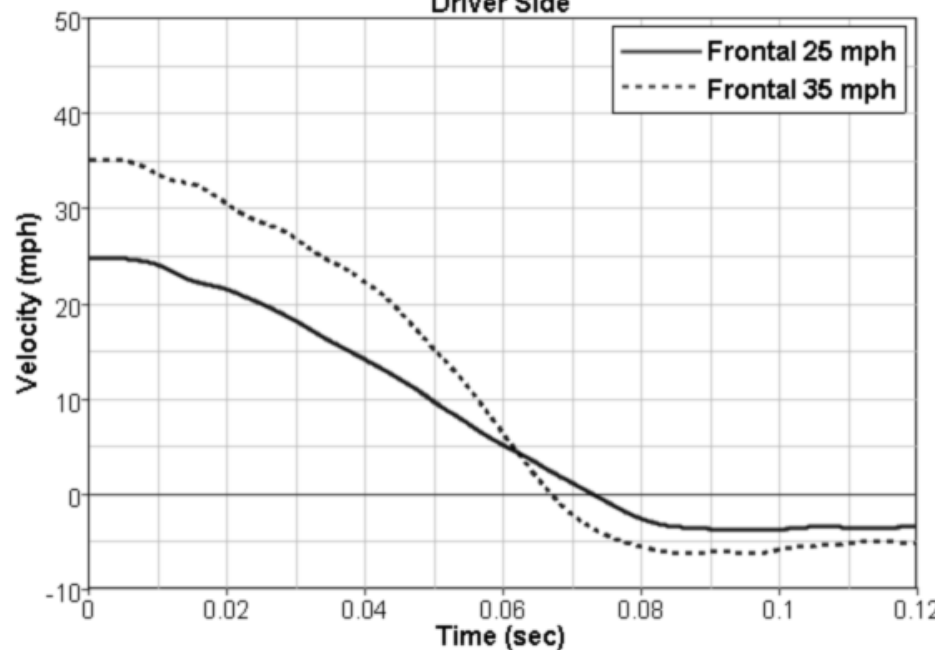
Driver Side



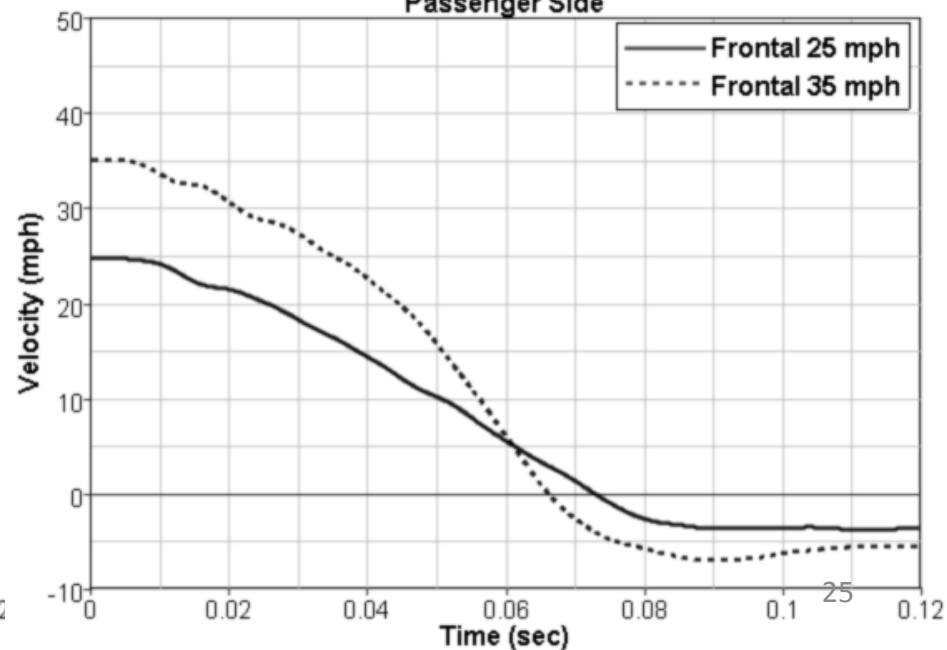
Passenger Side



Driver Side

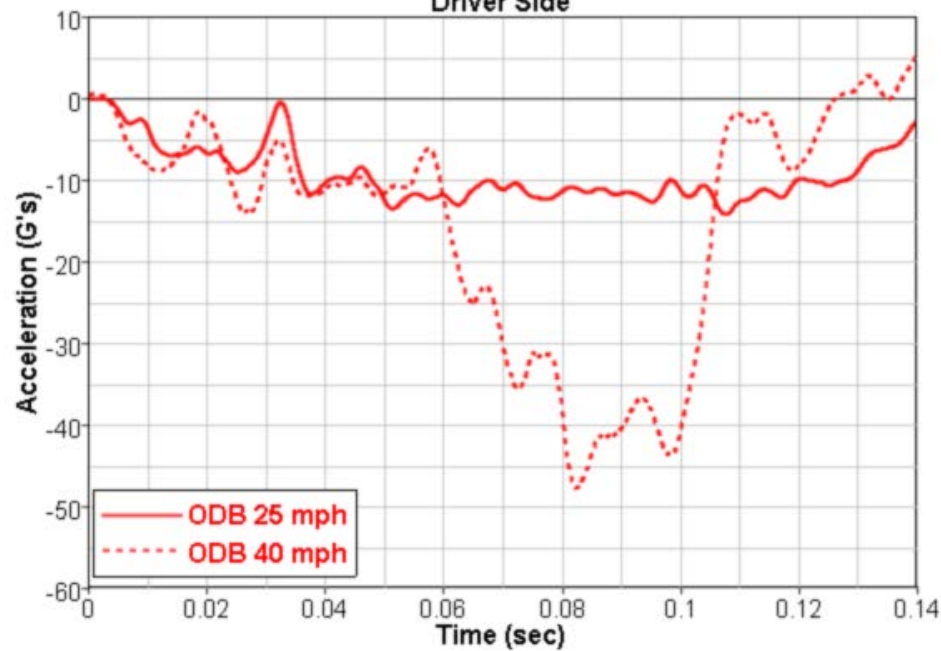


Passenger Side

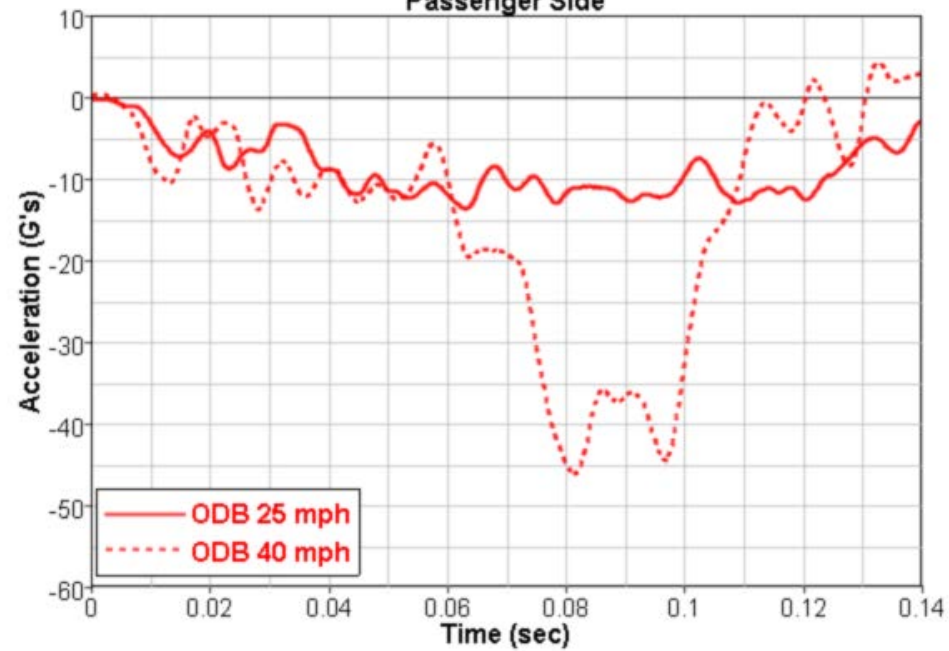


40% overlap ODB @ 25 & 40 mph

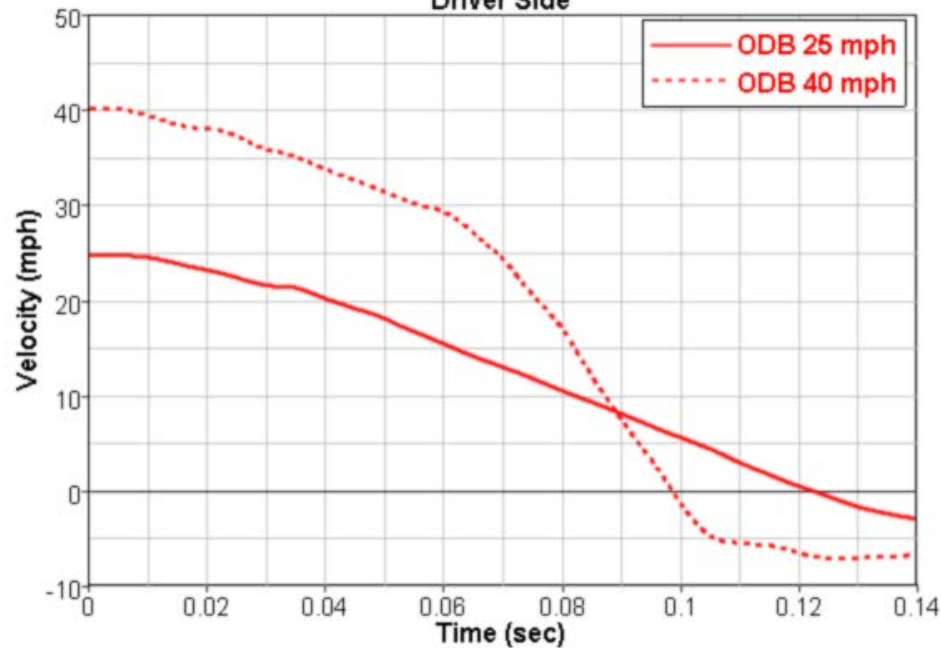
Driver Side



Passenger Side



Driver Side



Passenger Side

