

2018 Dodge Ram 1500 FE Detailed Mesh Model v3 Validation

**Center for Collision Safety & Analysis, George
Mason University**

Vehicle Description

➤ 2018 RAM 1500 Quad-Cab 2WD

- ⇒ VIN 2GCEC13C771511793
- ⇒ Model: 4-Door Quad-Cab 4x2 Pick-up
- ⇒ Engine 5.7L V8
- ⇒ Transmission 8-Speed Automatic
- ⇒ Tire Size: P265/70R17
- ⇒ Curb weight – 2337 kg



2018 MODEL YEAR

RAM 1500 TRADESMAN QUAD CAB 4X2

THIS VEHICLE IS MANUFACTURED TO MEET SPECIFIC UNITED STATES REQUIREMENTS. THIS VEHICLE IS NOT MANUFACTURED FOR SALE OR REGISTRATION OUTSIDE OF THE UNITED STATES.

MANUFACTURER'S SUGGESTED RETAIL PRICE OF THIS MODEL INCLUDING DEALER PREPARATION

RAM 1500 ST QUAD CAB 4X2

Exterior Color: Bright White Clear Coat Exterior Paint
Interior Color: Black / Diesel Gray Interior Colors
Interior: Heavy Duty Vinyl 40 / 20 / 40 Split Bench Seat
Engine: 5.7-Liter V8 HEMI® MDS VVT Engine

Transmission: 8-Speed Automatic 8HP70 Transmission
STANDARD EQUIPMENT (UNLESS REPLACED BY OPTIONAL EQUIPMENT)
FUNCTIONAL/SAFETY FEATURES

Advanced Multistage Front Airbags
Supplemental Side-Curtain Front and Rear Airbags
Supplemental Front Seat-Mounted Side Airbags
Supplemental Side-Curtain Airbags
ParkView® Rear Back Up Camera
3.21 Rear Axle Ratio
Trailer Tow with 4-Pin Connector Wiring
7 Pin Wiring Harness
26-Gallon Fuel Tank
Locking Tailgate
Anti-Lock 4-Wheel Disc Brakes
Electronic Stability Control
Speed Control
Sentry Key® Theft Deterrent System

INTERIOR FEATURES

Radio 3.0
6 Speakers
Media Hub (USB, Aux)
Remote USB Port – Charge-Only
Auto-Dimming Rear View Mirror with Display
Tilt Steering Column
Black Rotary Shifter
Instrument Cluster with Display Screen
Electronic Vehicle Information Center
Front Armrest with Three Cup Holders
Power Door Locks
Power Front Windows w/ 1-Touch Up and Down Feature
40 / 20 / 40 Split Bench Seat
Rear Folding Seat
Rear Under Seat Storage Compartment
Black Vinyl Floor Covering

EXTERIOR FEATURES

17-Inch x 7.0-Inch Steel Wheels
P265/70R17 BSW All Season Tires

Halogen Quad Headlamps
Automatic Headlamps
Black Front Bumper
Black Rear Bumper
Black Grille

OPTIONAL EQUIPMENT (May Replace Standard Equipment) Customer Preferred Package 278

8-Speed Automatic 8HP70 Transmission
5.7-Liter V8 HEMI® MDS VVT Engine
Uconnect® 3.0
Integrated Voice Command with Bluetooth®

WARRANTY COVERAGE

5-year or 60,000-mile Powertrain Limited Warranty.
3-year or 36,000-mile Basic Limited Warranty.
Ask Dealer for a copy of the limited warranties or see your owner's manual for details.

**5 YEAR / 60,000 MILE
POWERTRAIN WARRANTY**

Assembly Point/Port of Entry: WARREN, MICHIGAN, U.S.A.

vin: 1C6-RR6FT6JS-232374

LA VIN: 5525

S.L.

SHIP TO:

SOLD TO:



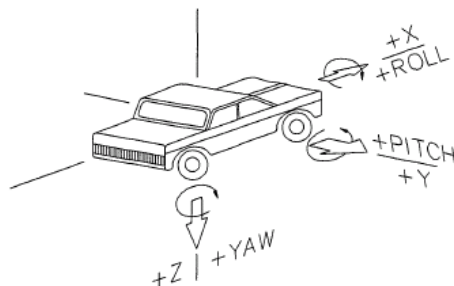
THIS LABEL IS ADDED TO THIS VEHICLE TO COMPLY WITH FEDERAL LAW. THE LABEL CANNOT BE REMOVED OR ALTERED PRIOR TO DELIVERY TO THE ULTIMATE PURCHASER.

*STATE AND/OR LOCAL TAXES IF ANY, LICENSE AND TITLE FEES AND DEALER SUPPLIES AND INSTALLED OPTIONS AND ACCESSORIES ARE NOT INCLUDED IN THIS PRICE. DISCOUNT, IF ANY, IS BASED ON PRICE OF OPTIONS IF PURCHASED SEPARATELY.

Non-destructive Inertia Measurements

➤ Inertia testing conducted at SEA ltd. prior to vehicle teardown

Pitch inertia, kg-m ²	5895
Yaw inertia, kg-m ²	6291
Roll inertia, kg-m ²	1037
Vehicle CG height, mm	730.4



S-E-A VIMF

Vehicle Inertia Measurement Facility

VIMF Test #: 6865 Test Date: 4/10/2018 Date Printed: 4/13/2018 Front Track (mm): 1732.28
 Year: 2018 Project: GMU Rear Track (mm): 1715.77
 Make: Dodge VIN: 1C6RR6FT6JS232374 Average Track (mm): 1724.03
 Model: Ram 1500 Mileage: Roof Height (mm): 1906.27
 Wheelbase (mm): 3561.08
 Description: Curb, Full Fuel, RWD, 4 Door, Pickup Extended Cab

Load: Curb

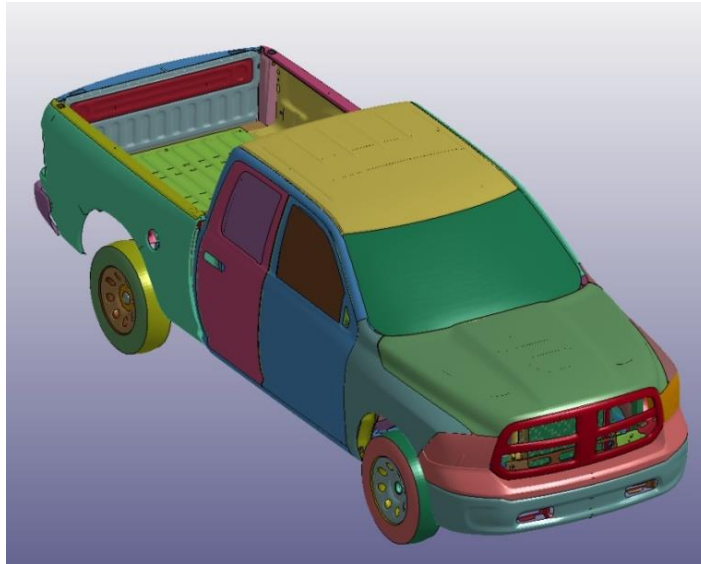
Front Tire Type: Goodyear Wrangler SR-A		Weights (kg)		Total Weight (kg)
Front Tire Size: P265/70R17 113R		Left Front	Right Front	2317.2
Front Tire: 40psi	2.76 bar	681.5	657.6	Lateral CG (mm)
Rear Tire Type: Goodyear Wrangler SR-A		Left Rear	Right Rear	-12.4
Rear Tire Size: P265/70R17 113R		493.8	484.3	Longitudinal CG (mm)
Rear Tire: 40psi	2.76 bar			1503.2



Applied Weight (kg)	Platform Angle (deg)	Motion Relative to Platform (mm)	CG Height (mm)	
0.000	0.085	0.000	0.0	
28.039	3.339	-0.647	729.7	
38.646	4.538	-0.931	729.4	
28.039	-3.200	0.572	731.2	
38.646	-4.408	0.884	731.5	
			730.4	
			T/2H = 1.180	
Period (sec)	Platform Amplitude (deg)	Relative Motion (mm)	Pitch Inertia (kg-m ²)	
5.341	4.123	0.772	5896	
5.340	4.010	0.747	5895	
5.340	3.934	0.731	5895	
			5895	
Period (sec)	Platform Amplitude (deg)	Relative Motion (mm)	Yaw Inertia (kg-m ²)	Roll/Yaw Product (kg-m ²)
3.562	3.221	0.268	6284	-36
3.564	3.148	0.259	6292	-37
3.565	3.139	0.257	6298	-36
			6291	-36
Period (sec)	Platform Amplitude (deg)	Relative Motion (mm)	Roll Inertia (kg-m ²)	
1.821	2.666	0.967	1035	
1.822	2.985	1.110	1037	
1.822	2.890	1.065	1038	
			1037	



Model Development



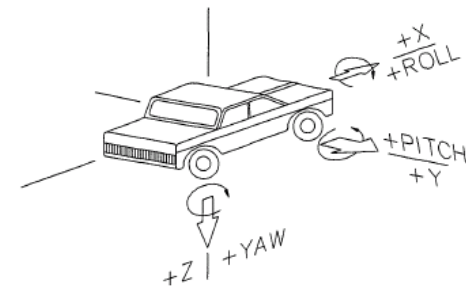
General Info

State:	1	
Nodes:	2691717	
Beams:	15600	Beam Materials: 4
Shells:	2606532	Shell Materials: 892
TShells:	0	TShell Materials: 0
Solids:	57954	Solid Materials: 65
SPH Nodes:	0	SPH Materials: 0
Discrete Elements:	20	Discrete Materials: 8
Seatbelt Elements:	0	Seatbelt Materials: 0
Nurbs Elements:	0	Nurbs Materials: 0
Discrete Sphere:	0	
Mass Elements:	213	
Inertia Elements:	0	
Nodal Rigid Bodies:	874	
Rigid Elements:	11489	
Deformable Elements:	2668617	
Total no. of Elements:	2680106	
Total no. of Parts:	971	

Inertia Comparisons

- 2317 kg for the physical vehicle includes a full tank of gasoline
- Fuel mass removed to create a 2270 kg FE model

	<i>Actual Vehicle</i>	<i>FE Model</i>
Weight, kg	2317	2317
Pitch inertia, kg-m ²	6291	5869
Yaw inertia, kg-m ²	5895	6287
Roll inertia, kg-m ²	1037	995
Vehicle CG height, mm	730.4	734.4



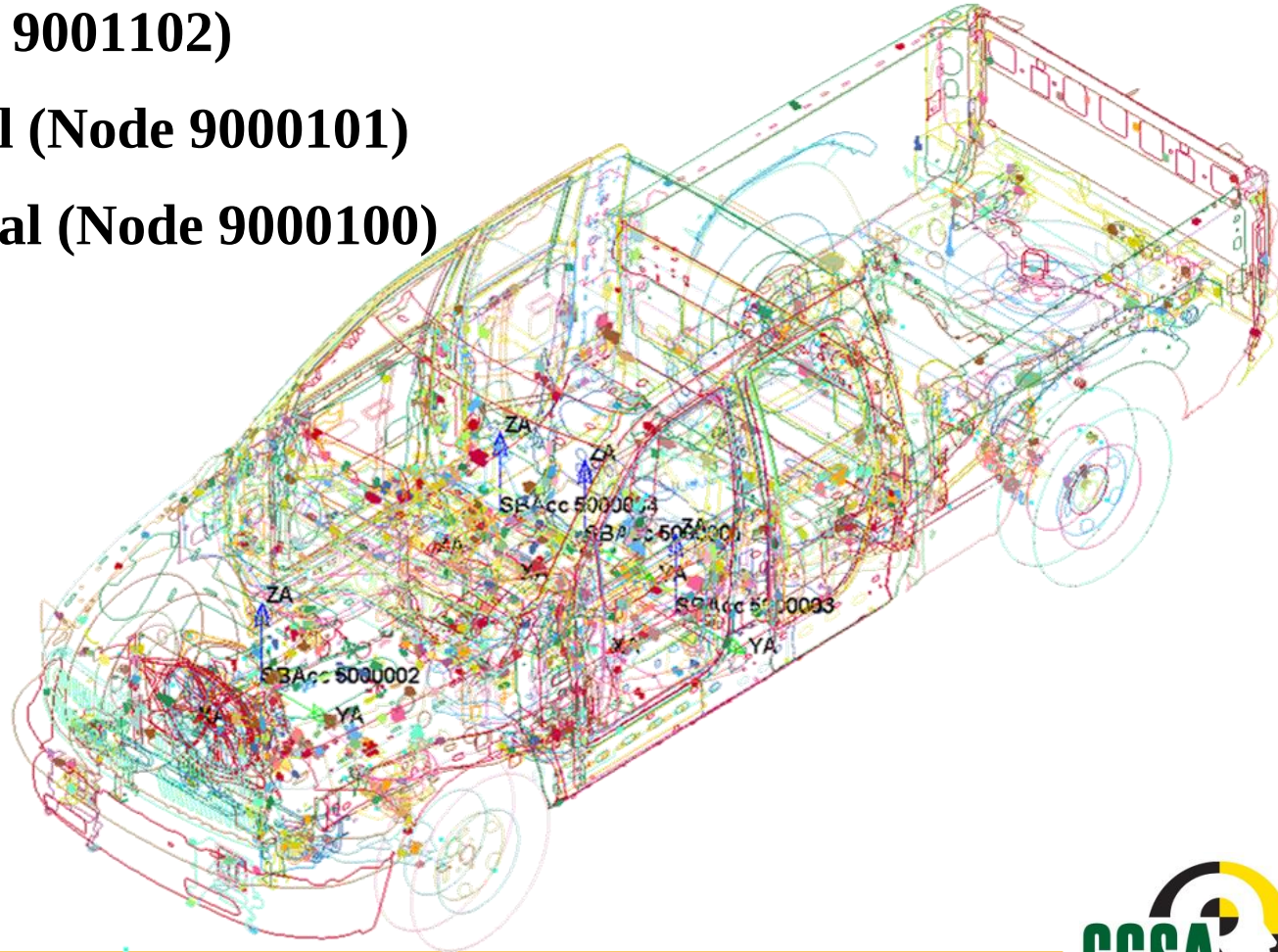
Full-scale Crash Tests

➤ Dodge Ram (2009 – 2018) Fourth generation

Test Type	Test Number
Frontal Full Wall	NHTSA 6600 (56.3 km/hr),
Frontal Offset	
Side Impact NHTSA	
Side Impact IIHS	
Roadside Hardware Test	TTI 404160-13-1, MwRSF OSSB-1, Caltrans 110MASH4P18-02, TTI 9-1002-12-13, TTI 476460-1-4
Vehicle to Vehicle	
Roof Strength	
Speed Bump	FOIL 18005 (8 tests: varied speed bump configurations)
Sloped Terrain	
Suspension	FOIL 19013 (Rear Suspension System Bottom Out with damper), FOIL (Front Suspension System Bottom Out), FOIL (Rear Side Suspension System Characterization)

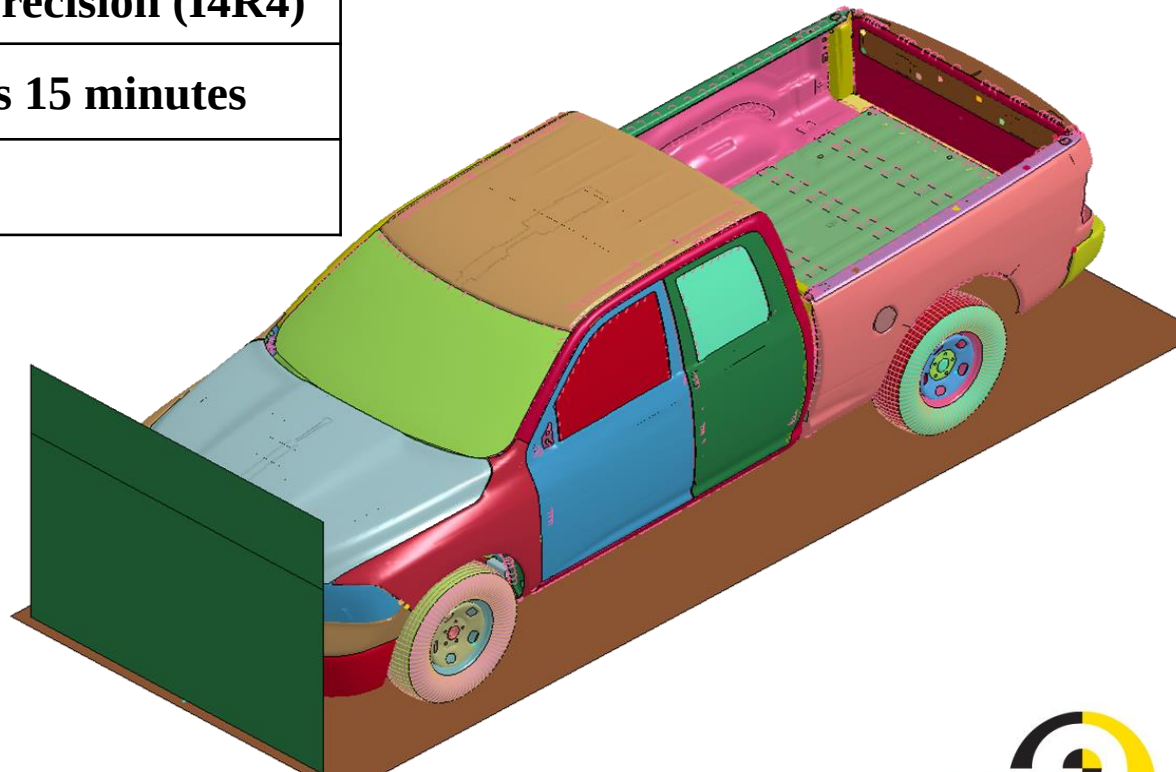
FE Model Connections – Accelerometers

- Left Rear Seat (Node 9001203)
- Right Rear Seat (Node 9001303)
- Engine Top (Node 9001102)
- Vehicle C.G. Local (Node 9000101)
- Vehicle C.G. Global (Node 9000100)



Simulation Benchmark

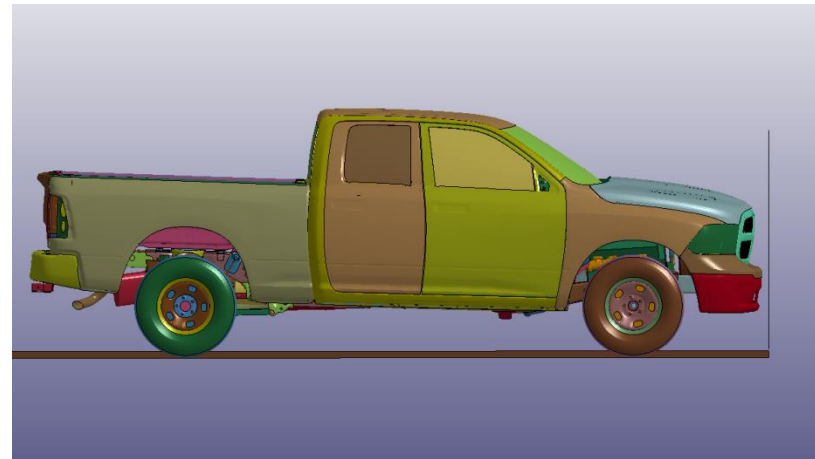
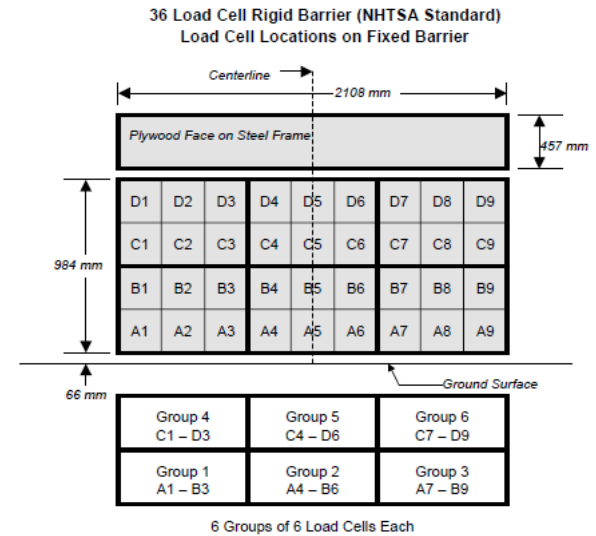
LS-DYNA	0.2 sec
Platform	Linux RHEL 5.4
Version	mpp sR8.0.0
Revision	95309
Precision	Single Precision (I4R4)
Time to simulate 100 ms	10 hours 15 minutes
Number of processors	16

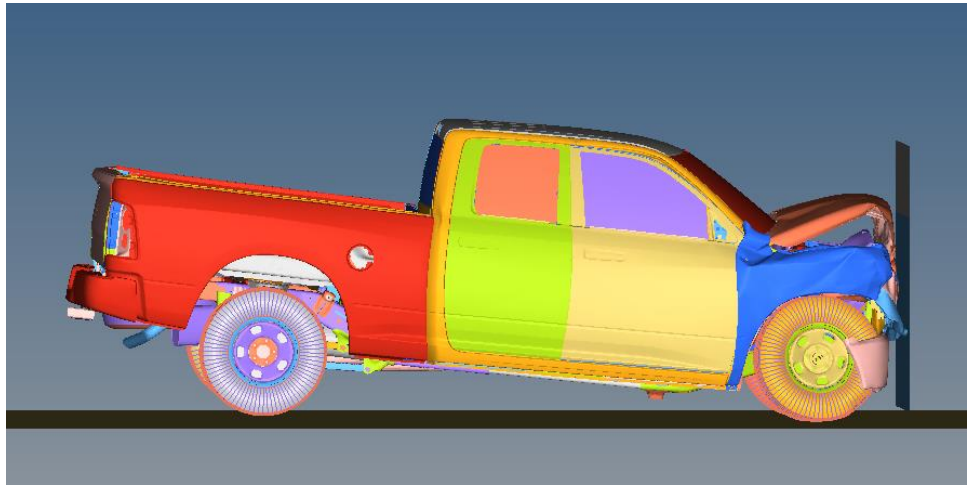
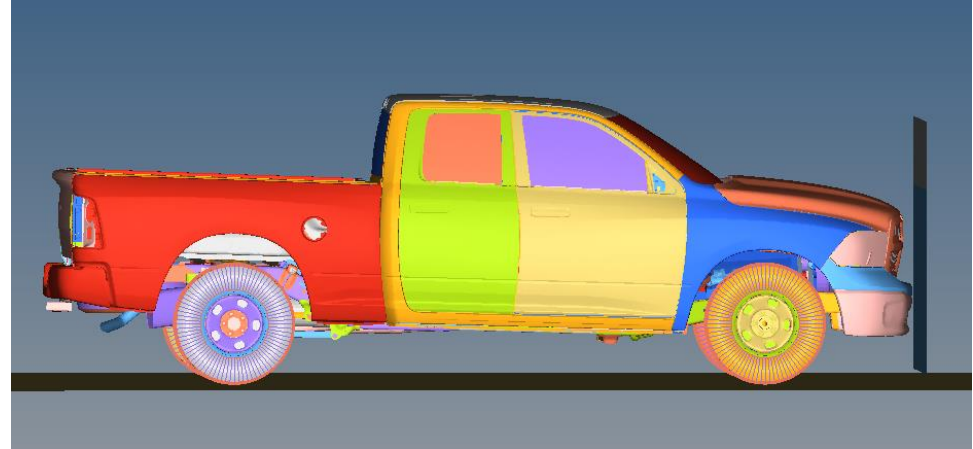


Full-scale Validations – Full Frontal

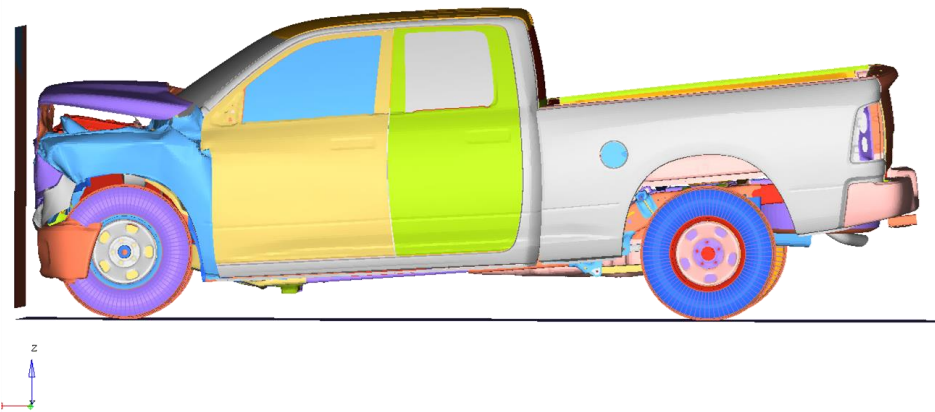
NHTSA Test 6600 (56.4 km/hr)

- Frontal NCAP
- 2009 Dodge Ram ST Quad Cab 4X4
- 36 load cell fixed wall

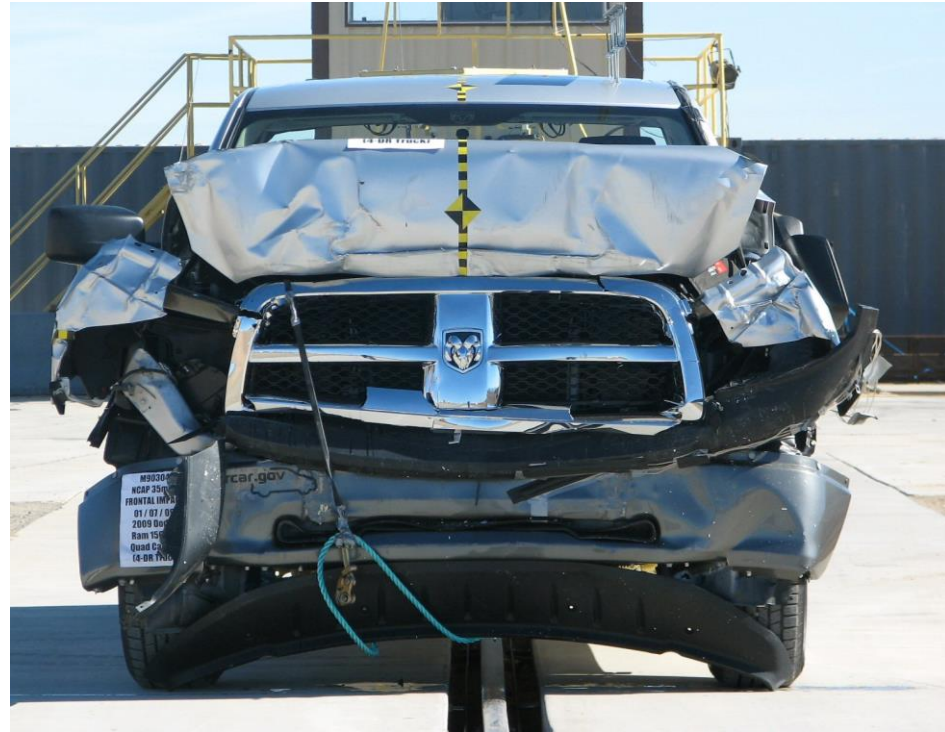
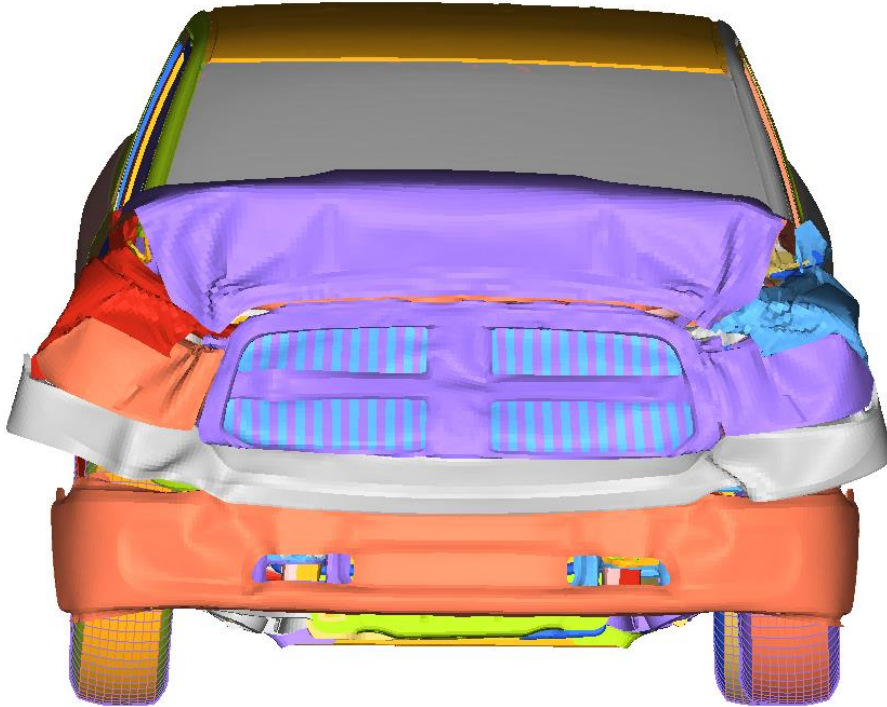




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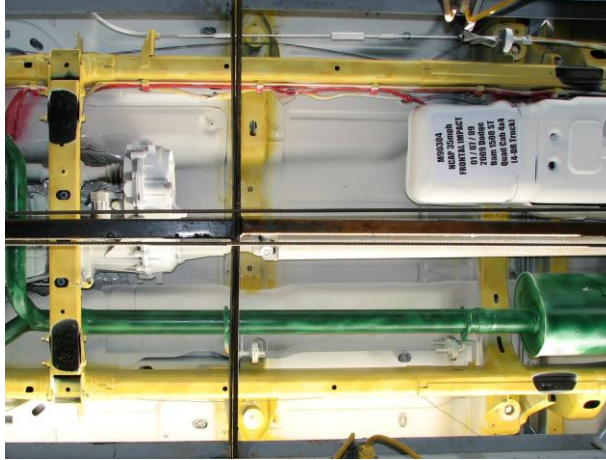


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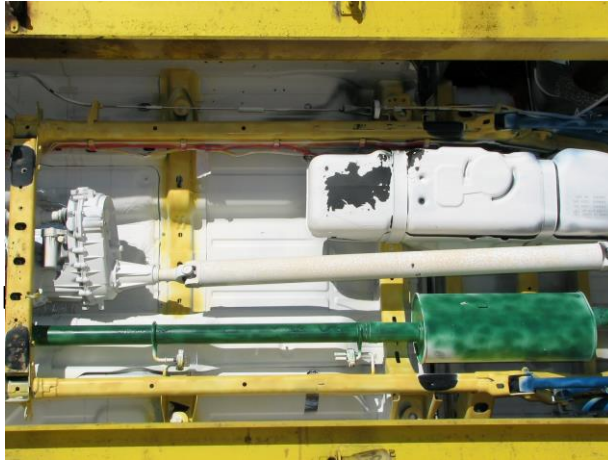


Full-scale Validations – Full Frontal

Pre-Test

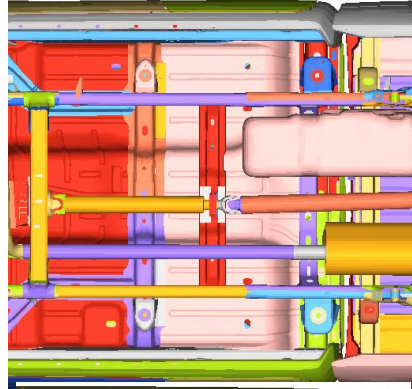
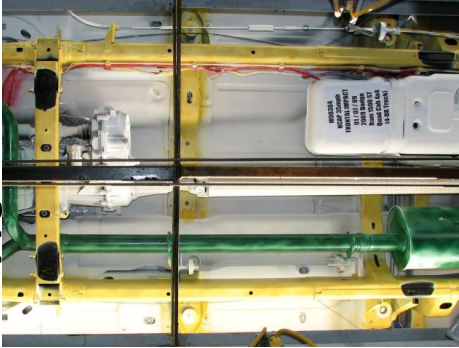


Post-

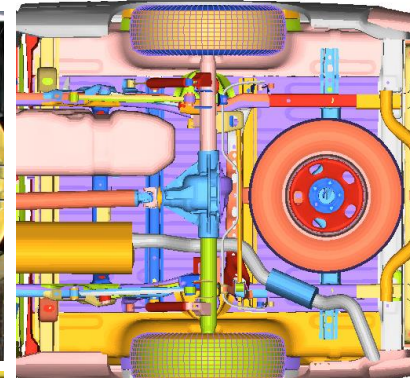
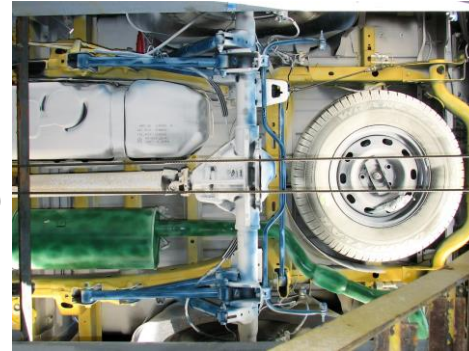


Full-scale Validations – Full Frontal

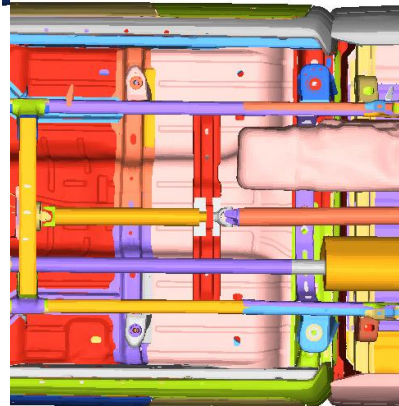
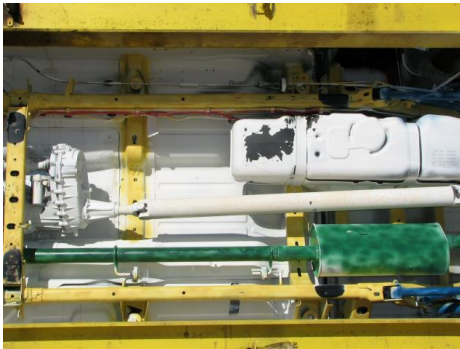
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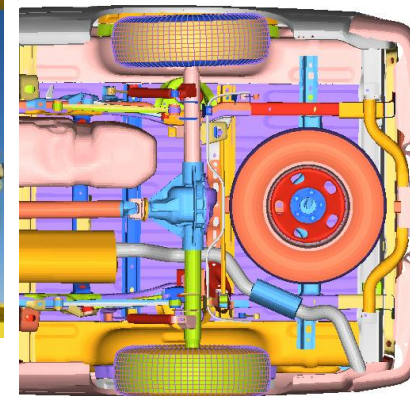
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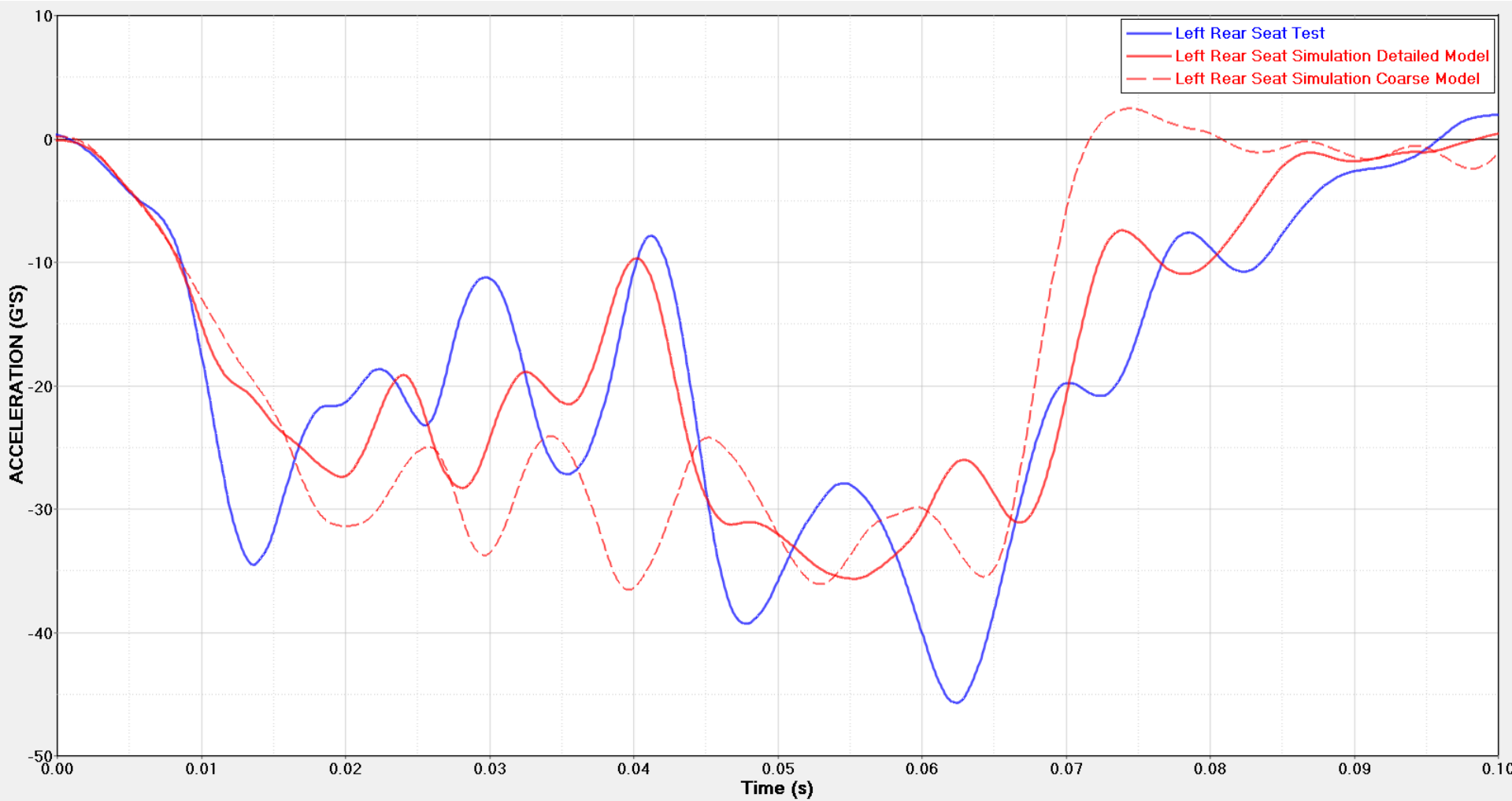
Post-



Post-



Full-scale Validations – Full Frontal



Full-scale Validations – Full Frontal

