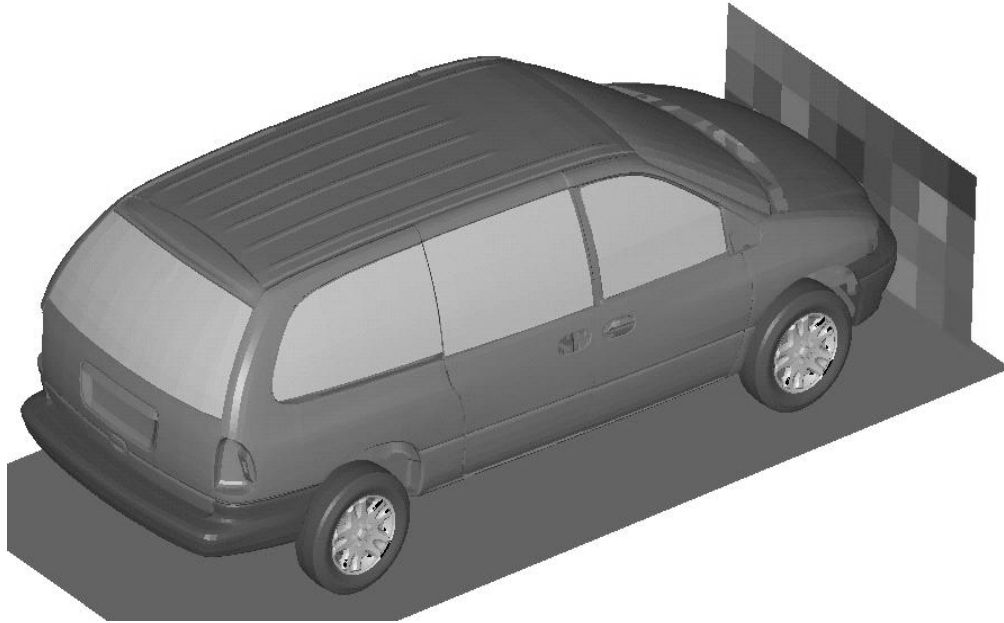


FE Model of DODGE GRAND CARAVAN Model Year: 1997



*FHWA / NHTSA National Crash Analysis Center
The George Washington University*

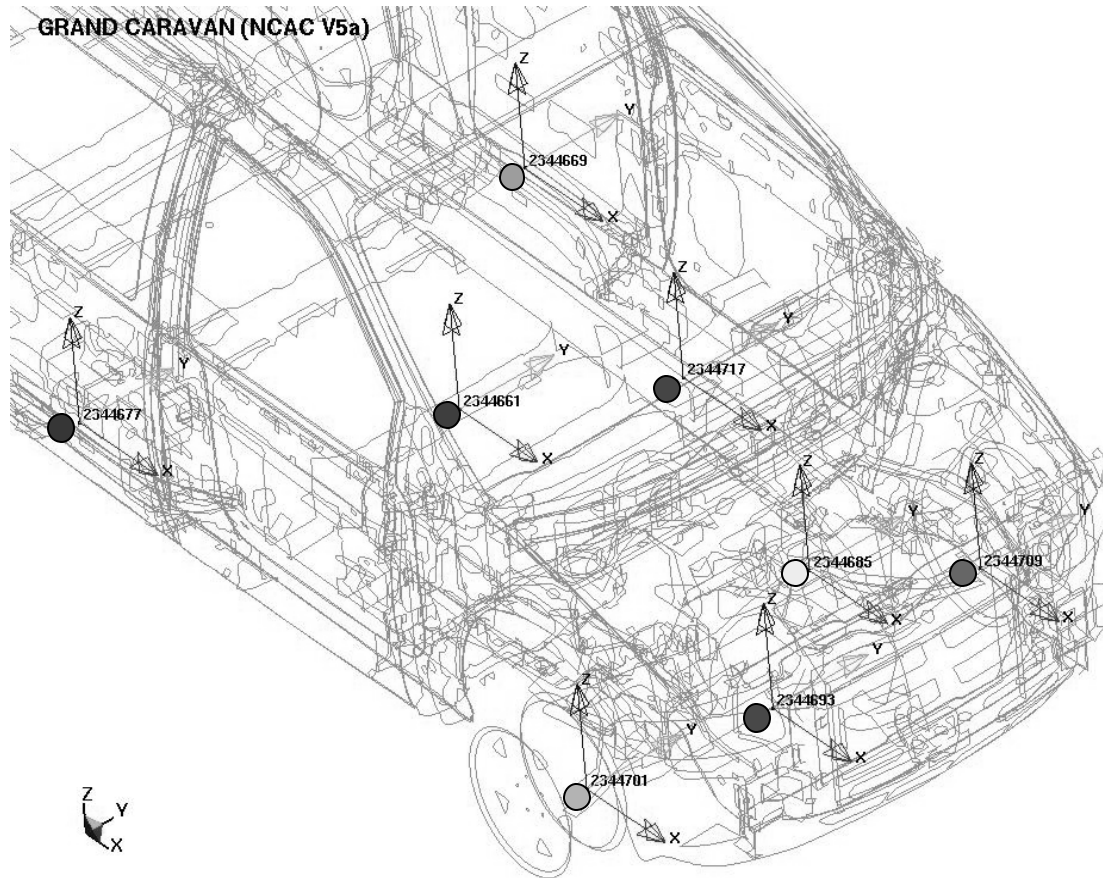
1997 Dodge Grand Caravan - Finite Element Model



File: Caravan_V07.key

Number of Parts	- 510
Number of Nodes	- 344724
Number of Solids	- 6253
Number of Beams	- 35
Number of Springs	- 4
Number of mass elements	- 317
Number of Shells	- 327163
Number of Elements	- 333455

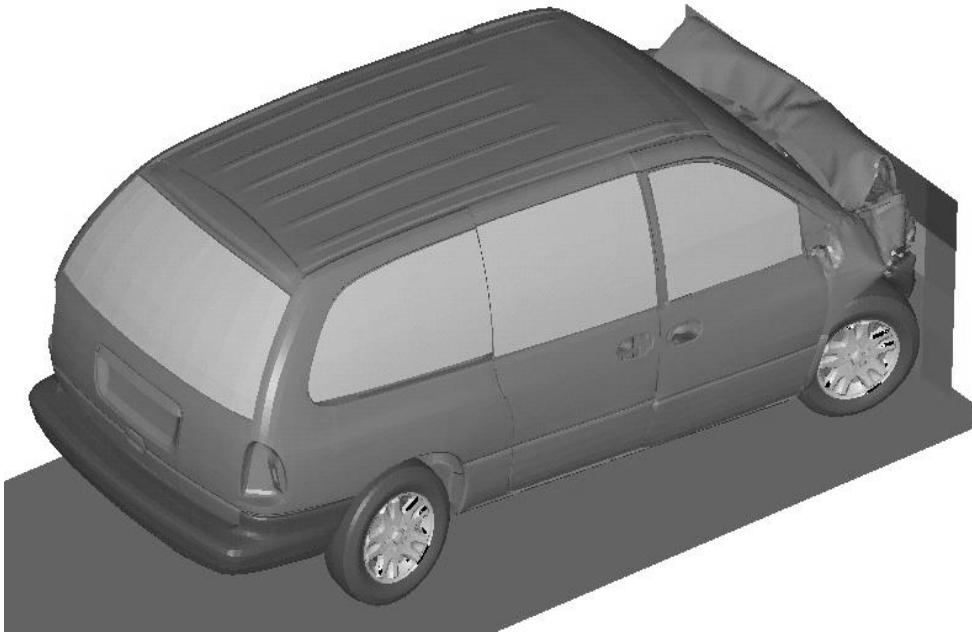
1997 Dodge Grand Caravan- Accelerometer Locations



Accelerometer Locations

● Vehicle CG	2344661
● Left seat	2344669
● Right seat	2344677
○ Engine Top	2344685
● Engine Bottom	2344693
● R brake caliper	2344701
● L brake caliper	2344709
● IP top	2344717

1997 Dodge Grand Caravan – NCAP Simulation Results



LS-DYNA

Version: 970

Revision: 5434a

Platform: SGI Workstation

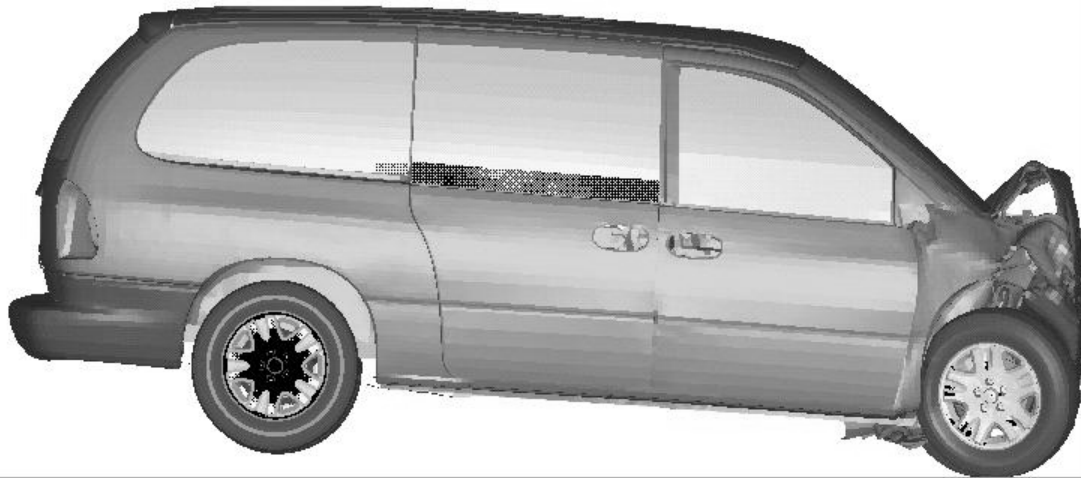
OS level: IRIX64 6.5 (64 bit)

Precision: Single precision (I4R4)

Total CPU time: ~ 32 hrs (for 150 ms)

Number of CPU's : 4

1997 Dodge Grand Caravan – NCAP Comparison



	FE Model	Test Vehicle
Weight (Kgs)	2043	2003
Engine Type	3.8L V6	3.3L V6
Tire size	P215/65 R15	P215/65 R15
Attitude (mm) As delivered	F - 798	F - 769
	R - 846	R - 766
Wheelbase (mm)	3030	3030
CG (mm) Rearward of front wheel C/L	1320	1319



1997 Dodge Grand Caravan – NCAP Summary

Test No.:	2335
Contract or Study Title:	1996 DODGE GRAND CARAVAN INTO FRONTAL LOAD CELL BARRIER
Test Performer:	TRC OF OHIO
Test Reference No.:	951108
Test Type:	NEW CAR ASSESSMENT TEST
Test Configuration:	VEHICLE INTO BARRIER
Closing Speed (kph):	56.2
Impact Angle (degrees):	0
Offset Distance (mm):	
Version No.:	3
Test Objectives:	OBTAIN 35 MPH NEW CAR ASSESSMENT AND RESEARCH DATA
Test Date:	11/8/1995
Contract No.:	DTNH22-90-D-22121
Test Track Surface:	CONCRETE
Test Track Condition:	DRY
Ambient Temperature (degrees Celsius):	21
Type of Recorder:	OTHER
Total No. of Curves:	123
Test Commentary:	NO COMMENTS

1997 Dodge Grand Caravan – NCAP Test Vehicle Data

Table 2 Test Vehicle Information, Cont'd.

Size of tires: P215/65R15

Tire pressure with maximum capacity vehicle load:

Front:	240 kPa
Rear:	240 kPa

Spare tire: Goodyear, T145/90D16

Type of front seats: Bucket

Tire & capacity data from vehicle's label:

Recommended tire size: P215/65R15

Recommended cold tire pressure:

Front:	240 kPa
Rear:	240 kPa

Designated seating capacity:

Front	2
Rear	5
Total	7

Vehicle capacity weight: 522 kg

Luggage weight: NA

Test vehicle attitude:

Delivered attitude:	LF 769 mm;	RF 769 mm;	LR 764 mm;	RR 767 mm
Pre-test attitude:	LF 745 mm;	RF 731 mm;	LR 739 mm;	RR 734 mm
Post-test attitude:	LF 870 mm;	RF 803 mm;	LR 871 mm;	RR 854 mm

Table 2 Test Vehicle Information Cont'd

Weight of test vehicle as received (with maximum fluids):

Right front	494 kg	Right rear	384 kg
Left front	556 kg	Left rear	381 kg
Total front weight	1050 kg	(57.9% of total vehicle weight)	
Total rear weight	765 kg	(42.1% of total vehicle weight)	
Total delivered weight	1815 kg		

Calculation of test vehicle's target test weight:

RCLW = Rated cargo and luggage weight

UDW = Unloaded delivered weight (1815 kg)

VCW¹ = Vehicle capacity weight (522 kg)

DSC = Designated seating capacity (7)

RCLW = VCW - 68 (DSC) = 392 - 68(5) = 46 kg

Target test weight = UDW + RCLW + (Number of Hybrid III dummies x 76 kg/dummy)

Target test weight = 1815 + 46 + 152

Target test weight = 2013 kg

Weight of test vehicle with required dummies and 36 kg of cargo weight:

Right front	549 kg	Right rear	441 kg
Left front	582 kg	Left rear	431 kg
Total front weight	1131 kg	(56.5% of total vehicle weight)	
Total rear weight	872 kg	(43.5% of total vehicle weight)	
Total test weight	2003 kg	(0.5% under target test weight)	

Weight of ballast secured in vehicle: 0 kg

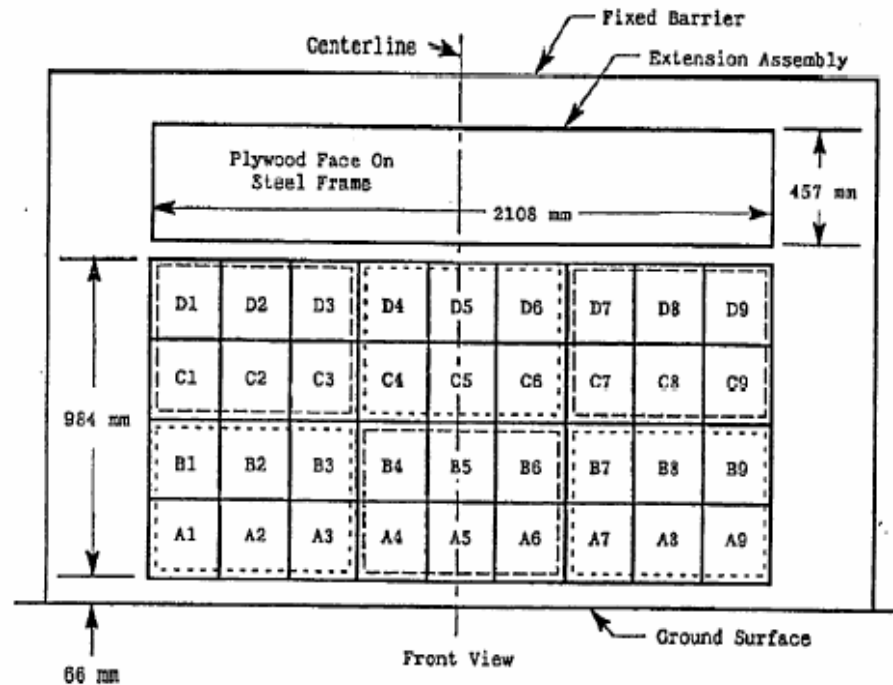
Components removed to meet target test weight: Rear bumper skin, rear speakers, left rear seat belt retractor, left rear interior side panel

CG rearward of front wheel centerline: 1319 mm

Vehicle wheelbase: 3030 mm

¹ From the vehicle's recommended tire pressure label.

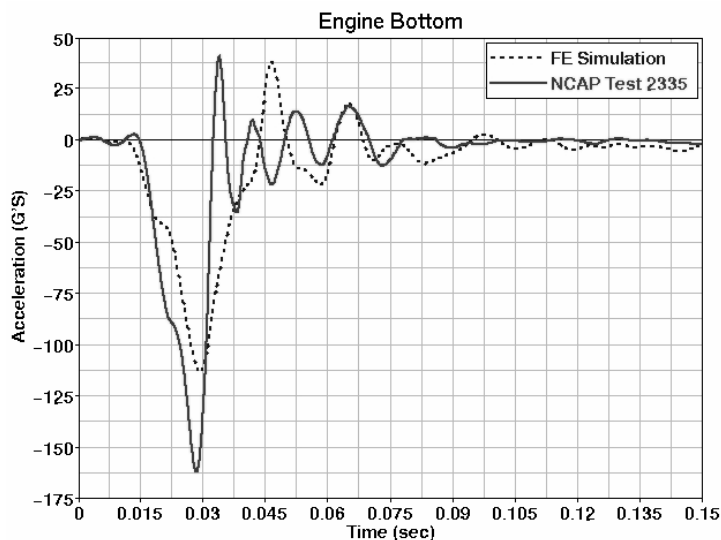
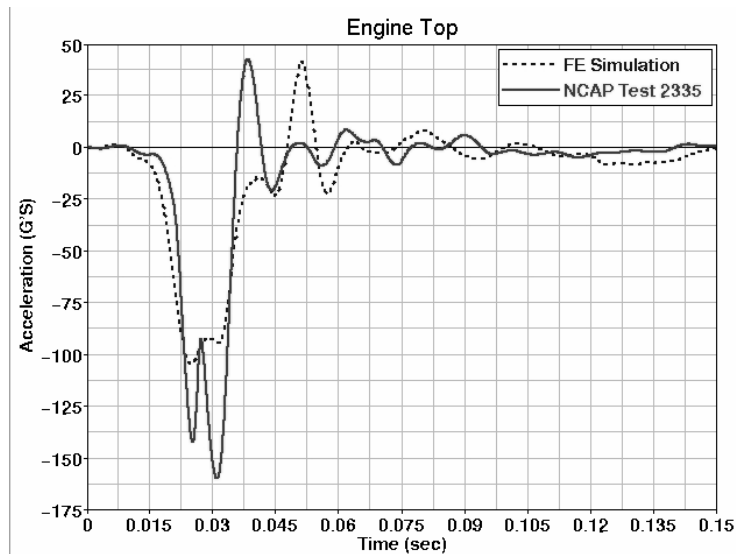
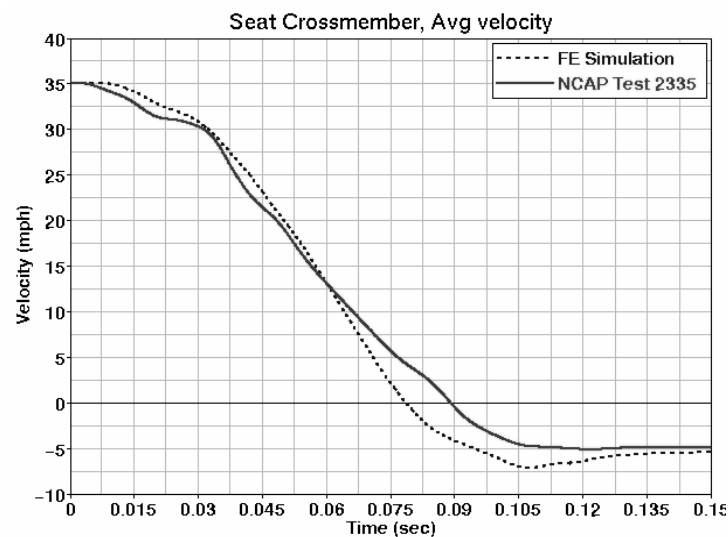
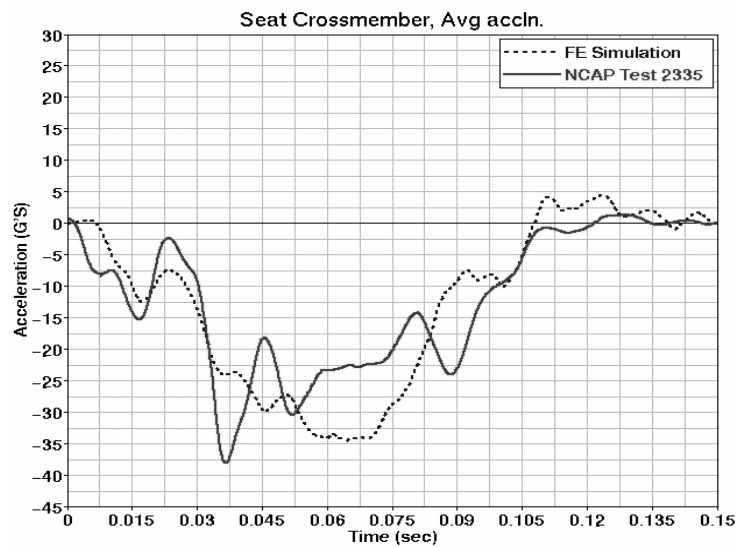
1997 Dodge Grand Caravan – NCAP Test Vehicle Data



6 GROUPS OF 6 LOAD CELLS EACH

Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

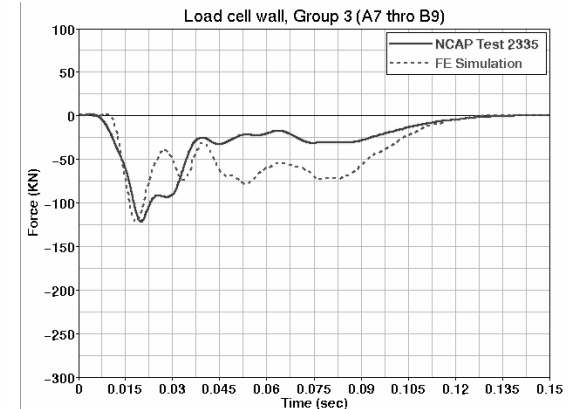
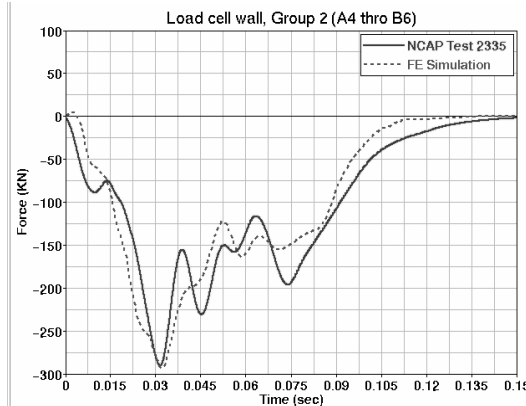
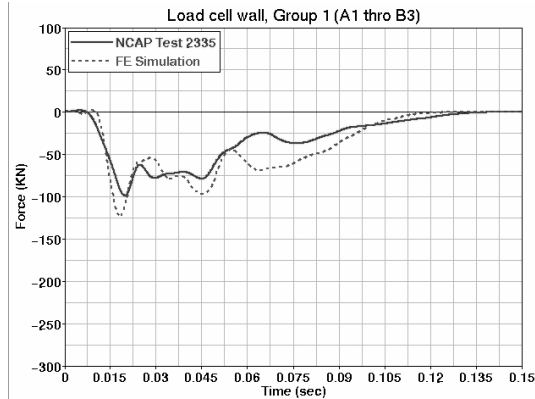
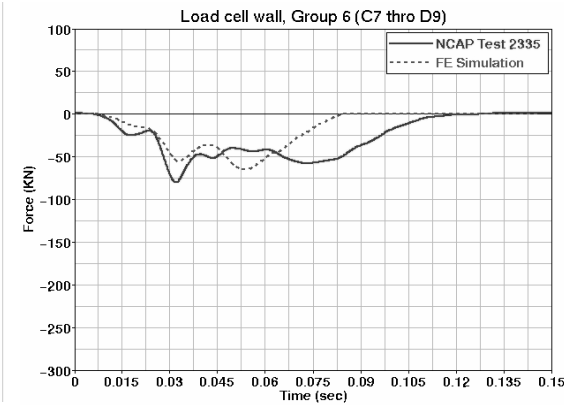
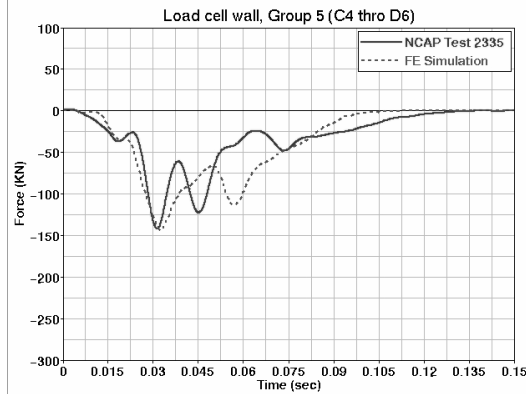
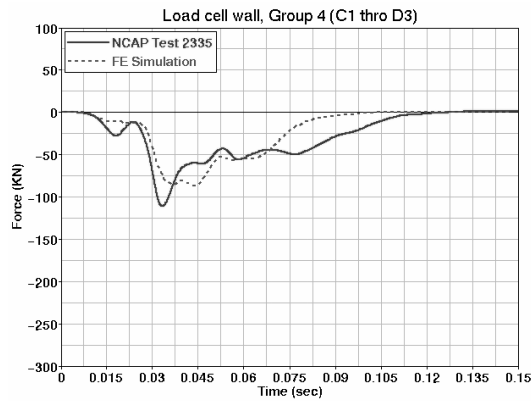
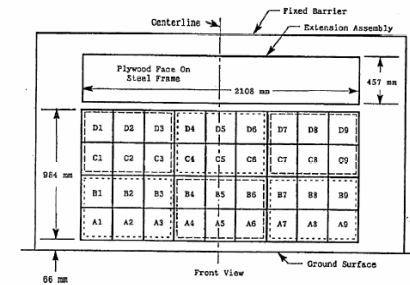
1997 Dodge Grand Caravan – NCAP Test Accelerometer Data



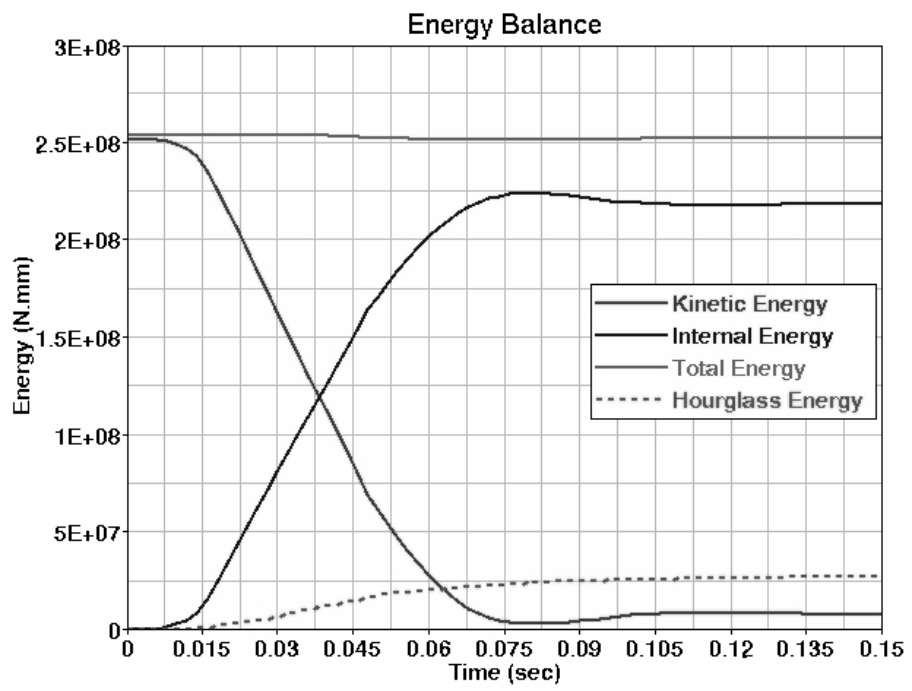
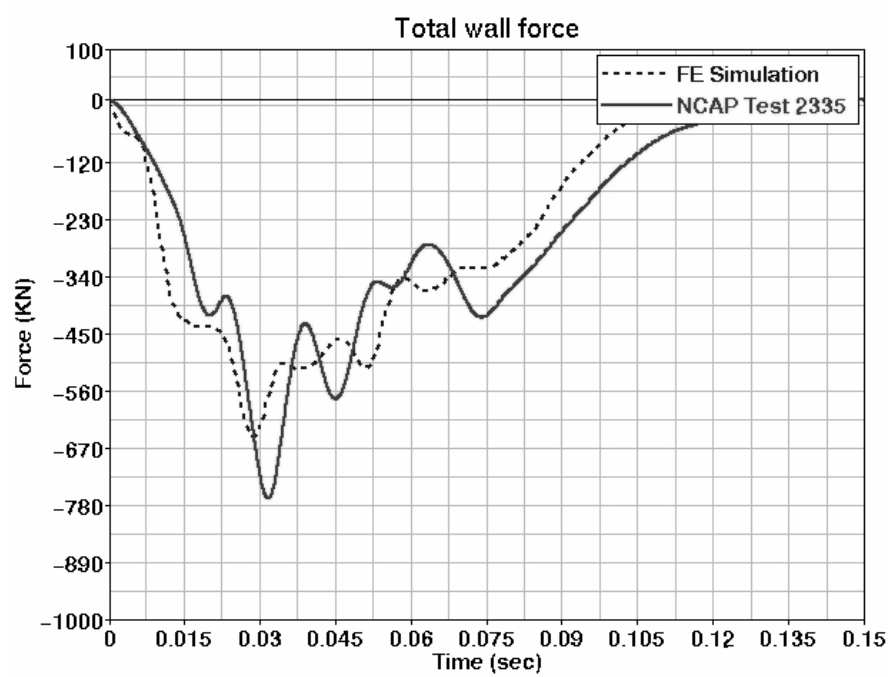
1997 Dodge Grand Caravan – NCAP Test Load Cell Data

6 GROUPS OF 6 LOAD CELLS EACH

Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9



1997 Dodge Grand Caravan – NCAP Total Wall Force & Energy Balance



1997 Dodge Grand Caravan – Results and Conclusions

1. FE model is stable in full frontal flat rigid wall simulations (Model has been run at 30, 35 and 40 mph to ensure stability)
2. The Accelerations and Total Wall Force is comparable to the NHTSA NCAP Test (2335)

Disclaimer

- This model has been developed at The FHWA/NHTSA National Crash Analysis Center at the George Washington University.
- The FE Model is 1997 Dodge Grand Caravan developed mainly for frontal impacts.
- The results from the model shows good correlation with NHTSA NCAP crash test results.
- The model is continuously updated to increase its capabilities in predicting responses in various impact scenarios. However, the user must verify his own results. Neither NCAC, GWU, FHWA, or NHTSA assume any responsibility for the validity, accuracy, or applicability of any results obtained from this model.
- Please feel free to contact us with any suggestions, comments, or questions.

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