



# **Finite Element Model of Dodge Neon**

**Model Year 1996  
Version 7**



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# FE Model of Dodge Neon



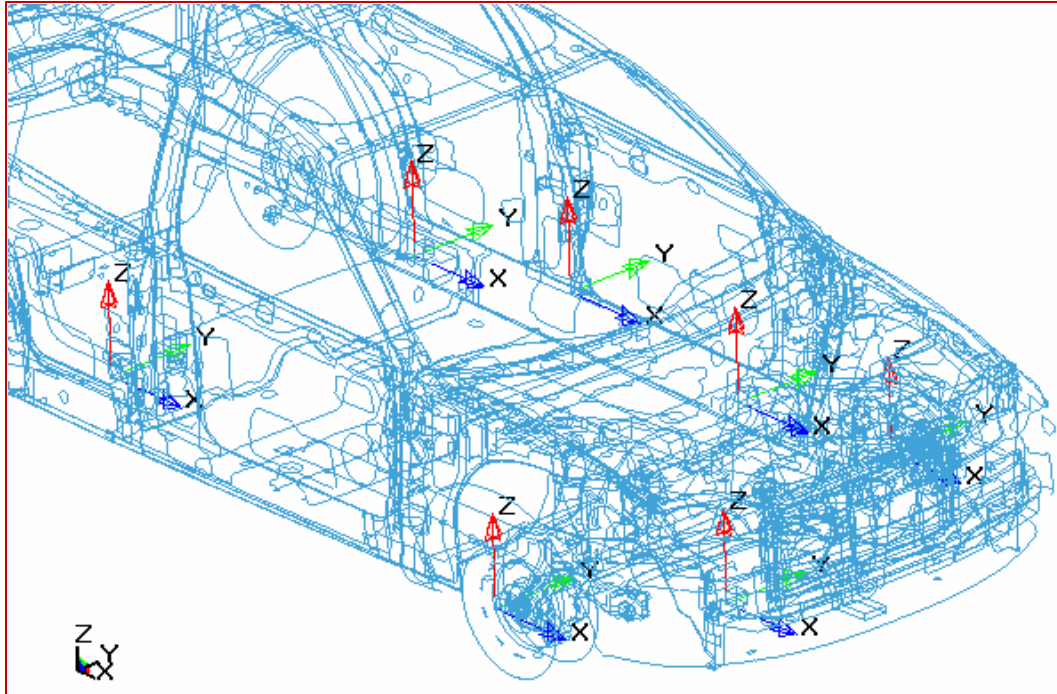
- **Model developed mainly for frontal impacts**
- **Material data derived from coupon testing**
- **Frontal NCAP validation complete**

Number of Parts	- 336
Number of Nodes	- 283859
Number of Solids	- 2852
Number of Beams	- 122
Number of Shells	- 267786
Number of Elements	- 270768



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# Accelerometer Locations



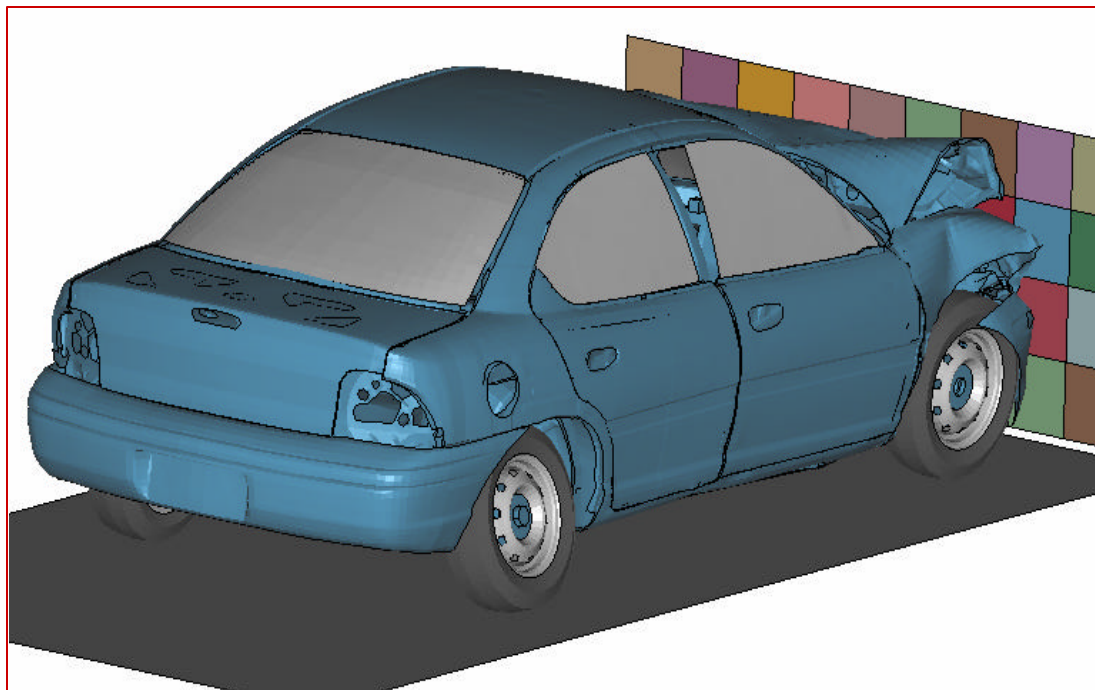
<u>Location</u>	<u>- Node ID</u>
Left seat	- 2800320
Right seat	- 2800328
Engine Top	- 2800336
Engine Bottom	- 2800344
R brake caliper	- 2800352
L brake caliper	- 2800360
IP top	- 2800368



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# Benchmark Data

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## LS-DYNA

**Version: 970**

**Revision: 5434a**

**Platform: SGI Workstation**

**OS level: IRIX64 6.5 (64 bit)**

**Precision: Single precision (I4R4)**

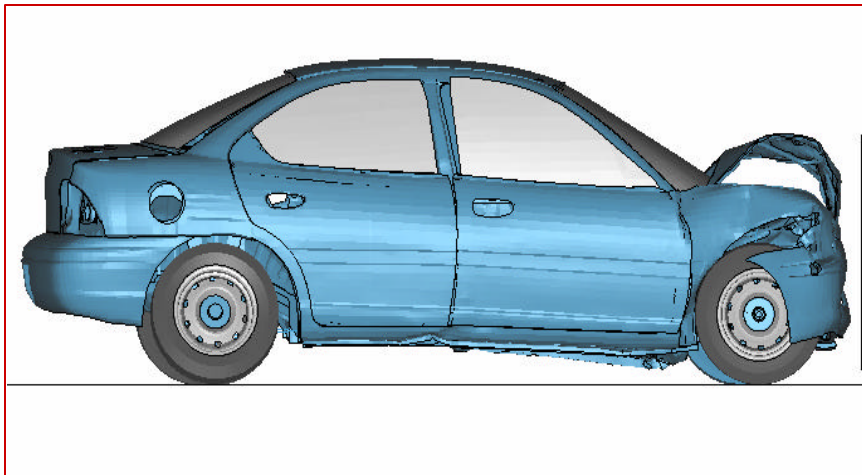
**Total CPU time: ~ 47 hrs (for 150 ms)**

**Number of processors: 4**



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# NCAP Comparison



	FE Model	Test Vehicle
Weight (Kgs)	1333	1354
Engine Type	2.0L I4	2.0L I4
Tire size	P185/65R15	P185/65R14
Attitude (mm) As delivered	F – 675	F – 660
	R – 665	R – 676
Wheelbase (mm)	2648	2642
CG (mm) Rearward of front wheel C/L	1046	1022



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# NCAP Test Summary

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**Test No.:** 2320

**Contract or Study Title:** 1996 DODGE NEON INTO FLAT FRONTAL BARRIER (Load cell wall)

**Test Performer:** TRC OF OHIO

**Test Reference No.:** 951026

**Test Type:** NEW CAR ASSESSMENT TEST

**Test Configuration:** VEHICLE INTO BARRIER

**Closing Speed (kph):** 56.5

**Impact Angle (degrees):** 0

**Offset Distance (mm):**

**Version No.:** 2

**Test Objectives:** OBTAIN 35 MPH NEW CAR ASSESSMENT AND RESEARCH DATA

**Test Date:** 10/26/1995

**Contract No.:** DTNH22-90-D-22121

**Test Track Surface:** CONCRETE

**Test Track Condition:** DRY

**Ambient Temperature (degrees Celsius):** 0

**Type of Recorder:** FM MULTIPLEXOR TAPE RECORDER

**Total No. of Curves:** 130

**Test Commentary:** THIS IS A 1995 TEST CONDUCTED ON 1996 VEHICLE





# NCAP Test Vehicle Data

Table 2 Test Vehicle Information

Vehicle year/make/ model/body style:	1996/Dodge/Neon/4-door sedan		
Color:	White		
VIN:	1B3ES47C7TD521089		
NHTSA number:	MT0301		
Engine data:			
Placement:	transverse		
Cylinders:	4		
Displacement	2.0 liters		
Transmission data:	<input type="checkbox"/> speed, <input type="checkbox"/> manual, <input checked="" type="checkbox"/> automatic, <input type="checkbox"/> overdrive <input checked="" type="checkbox"/> FWD, <input type="checkbox"/> RWD, <input type="checkbox"/> 4WD		
Date vehicle received:	10/23/95		
Odometer reading:	75		
Dealer's name and address:	Trader Bud's Westside Dodge 4000 West Broad Street Columbus, OH 43228		
<u>Accessories:</u>			
Power steering	Yes	Automatic transmission	Yes
Power brakes	Yes	Automatic speed control	No
Power seats	No	Tilting steering wheel	No
Power windows	No	Telescoping steering wheel	No
Tinted glass	Yes	Air conditioning	No
Radio	Yes	Anti-skid brake	No
Clock	Yes	Rear window defroster	Yes
Other	None		

Test vehicle attitude:

Delivered attitude:	LF 661 mm;	RF 659 mm;	LR 677 mm;	RR 676 mm
Pre-test attitude:	LF 644 mm;	RF 640 mm;	LR 648 mm;	RR 651 mm
Post-test attitude:	LF 754 mm;	RF 782 mm;	LR 643 mm;	RR 630 mm

Table 2 Test Vehicle Information Cont'd

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

Right front	368 kg	Right rear	200 kg
Left front	377 kg	Left rear	210 kg
Total front weight	745 kg	(64.5% of total vehicle weight)	
Total rear weight	410 kg	(35.5% of total vehicle weight)	
Total delivered weight	1155 kg		

Calculation of test vehicle's target test weight:

RCLW	=	Rated cargo and luggage weight
UDW	=	Unloaded delivered weight (1155 kg)
VCW <sup>1</sup>	=	Vehicle capacity weight (392 kg)
DSC	=	Designated seating capacity (5)
RCLW	=	VCW - 68 (DSC) = 392 - 68(5) = 52 kg
Target test weight	=	UDW + RCLW + (Number of Hybrid III dummies x 76 kg/dummy)
Target test weight	=	1155 + 52 + 152
Target test weight	=	1359 kg

Weight of test vehicle with required dummies and 47 kg of cargo weight:

Right front	411 kg	Right rear	255 kg
Left front	419 kg	Left rear	269 kg
Total front weight	830 kg	(61.3% of total vehicle weight)	
Total rear weight	524 kg	(38.7% of total vehicle weight)	
Total test weight	1354 kg	(0.4% under target test weight)	

Weight of ballast secured in vehicle: 0 kg

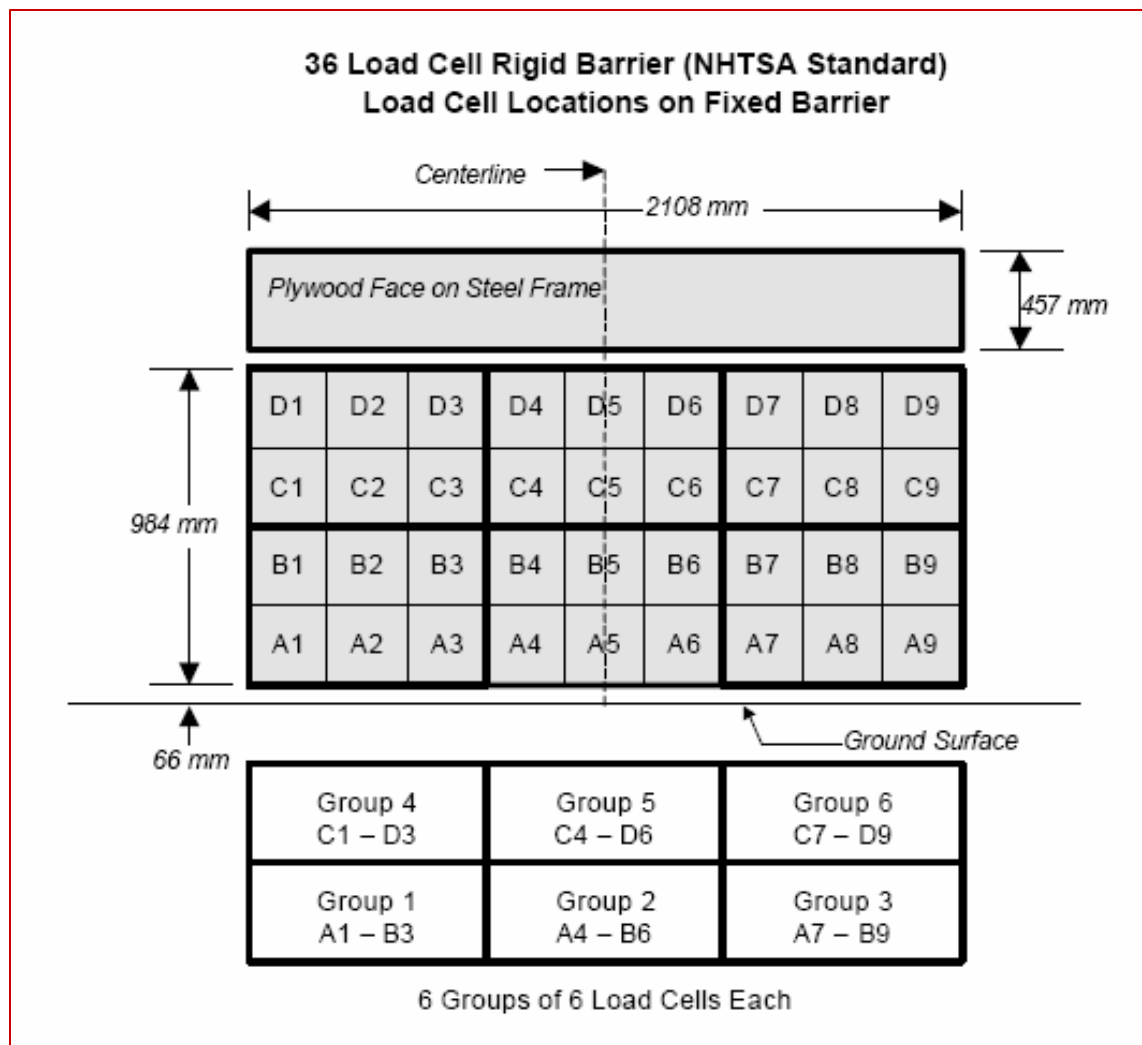
Components removed to meet target test weight: Rear bumper skin, tail lights, rear bumper foam, back seat, rear deck, and trunk seal

CG rearward of front wheel centerline: 1022 mm

Vehicle wheelbase: 2642 mm



# NCAP 36 load cell wall

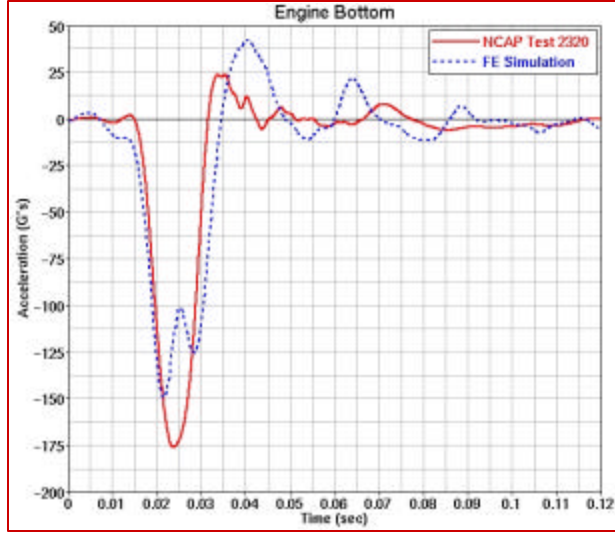
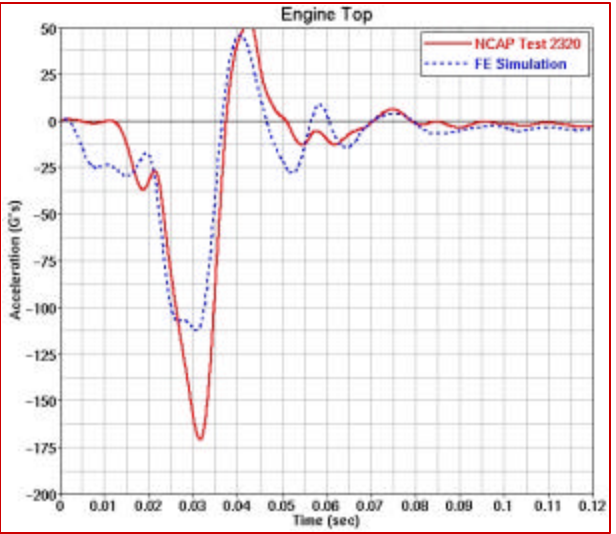
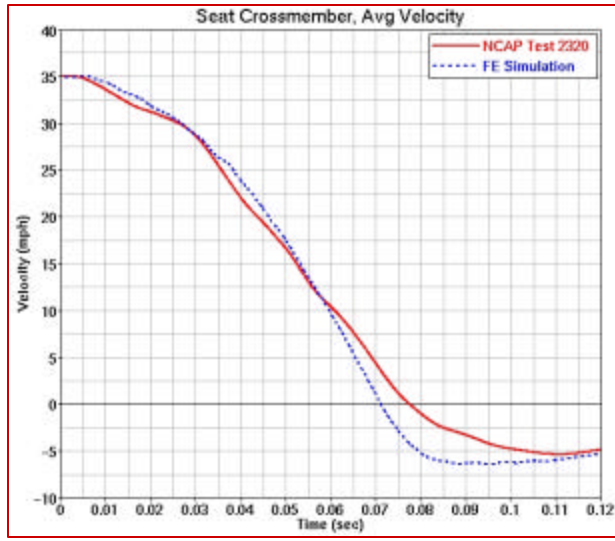
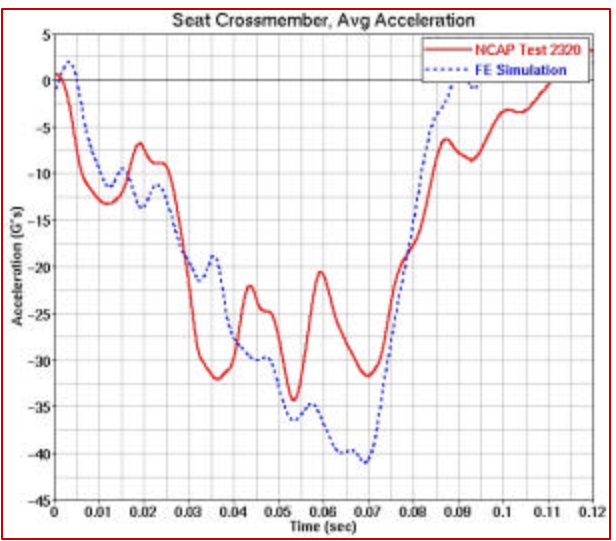






# Accelerometer Data

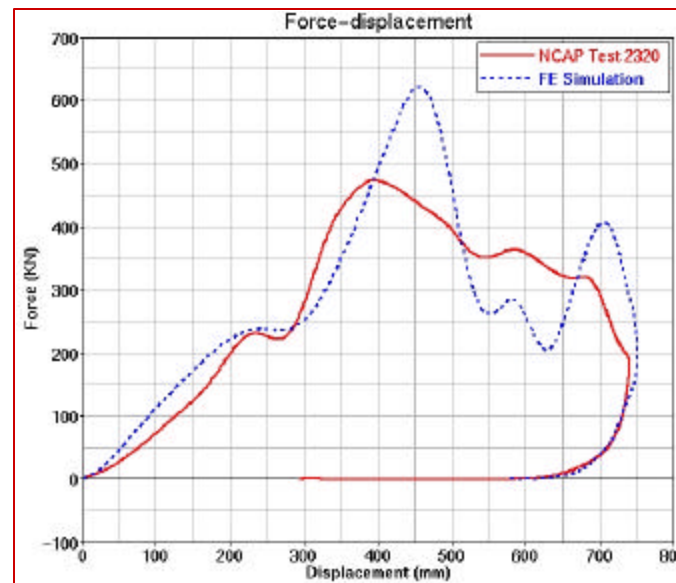
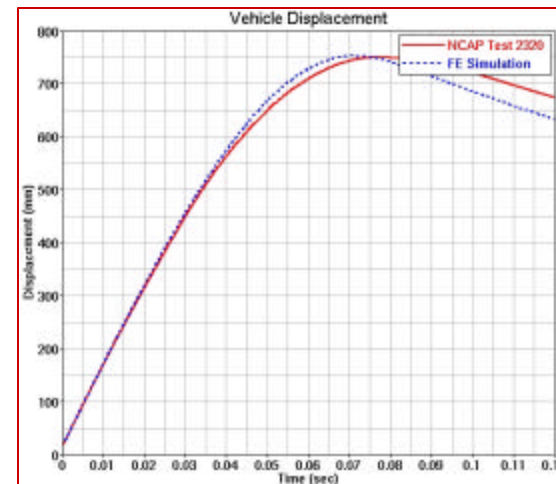
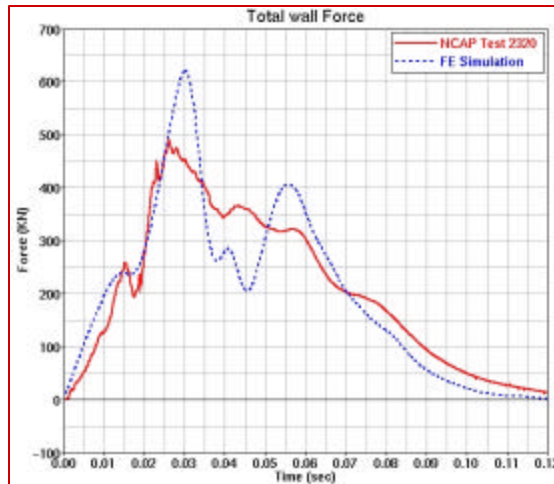
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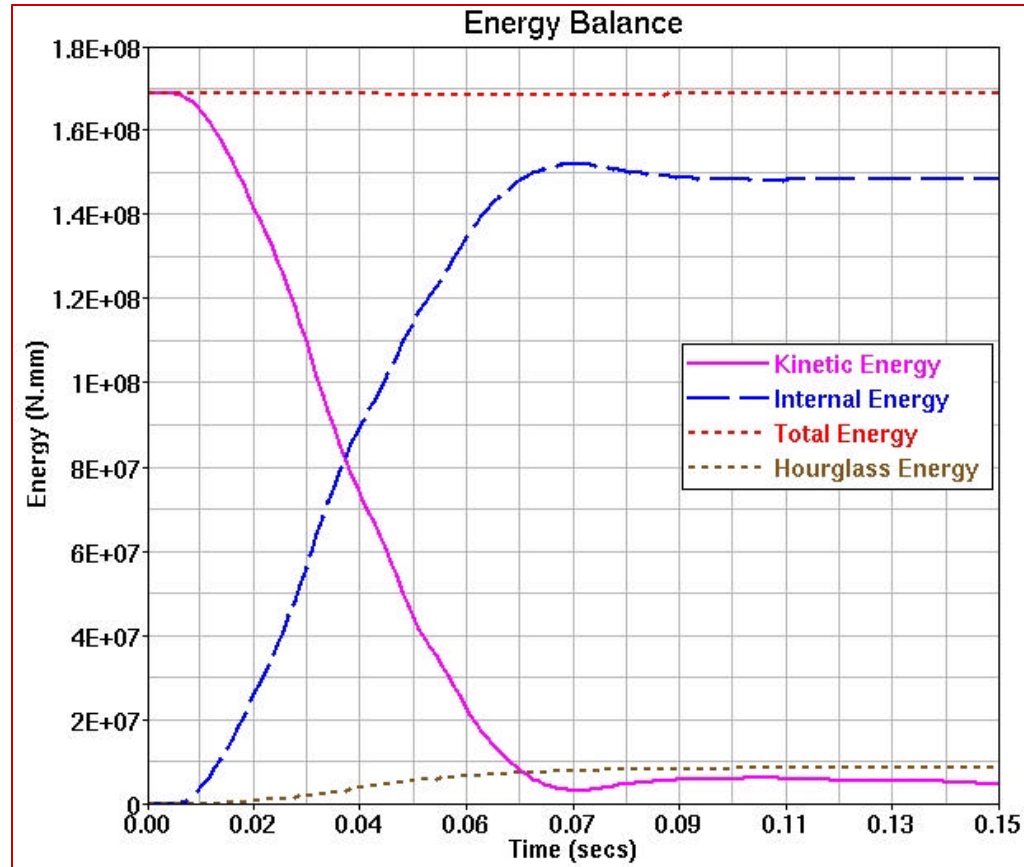
# Total wall force & displacement





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# Energy Balance





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# Notes

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- FE simulation is correlated to NCAP test. FE simulation shows higher wall force compared to the NCAP test.
- FE model is stable in full frontal flat rigid wall simulations ( Model has been run at 25, 30, 35 and 40 mph to ensure stability).