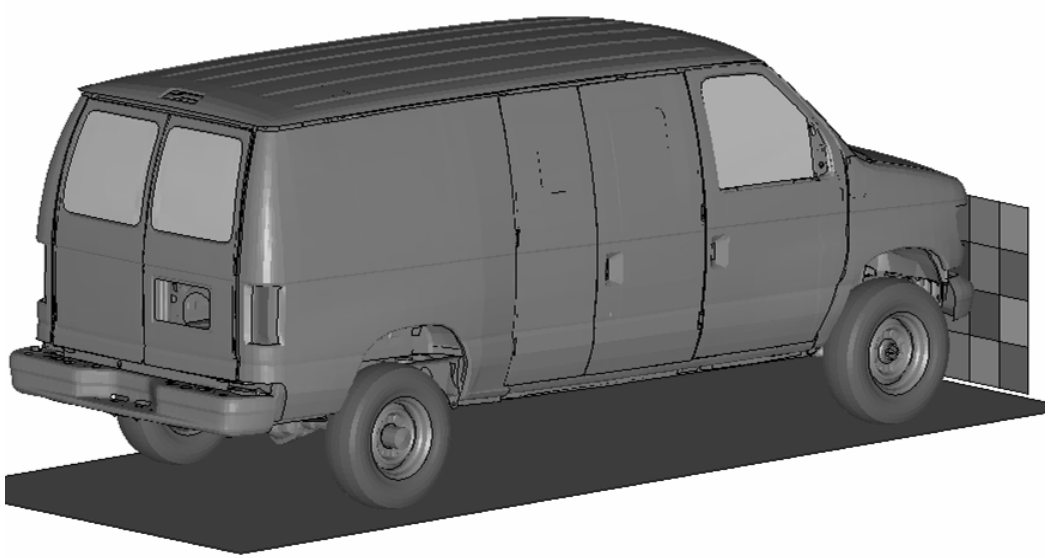
FE Model of
Ford Econoline
Model Year: 1998

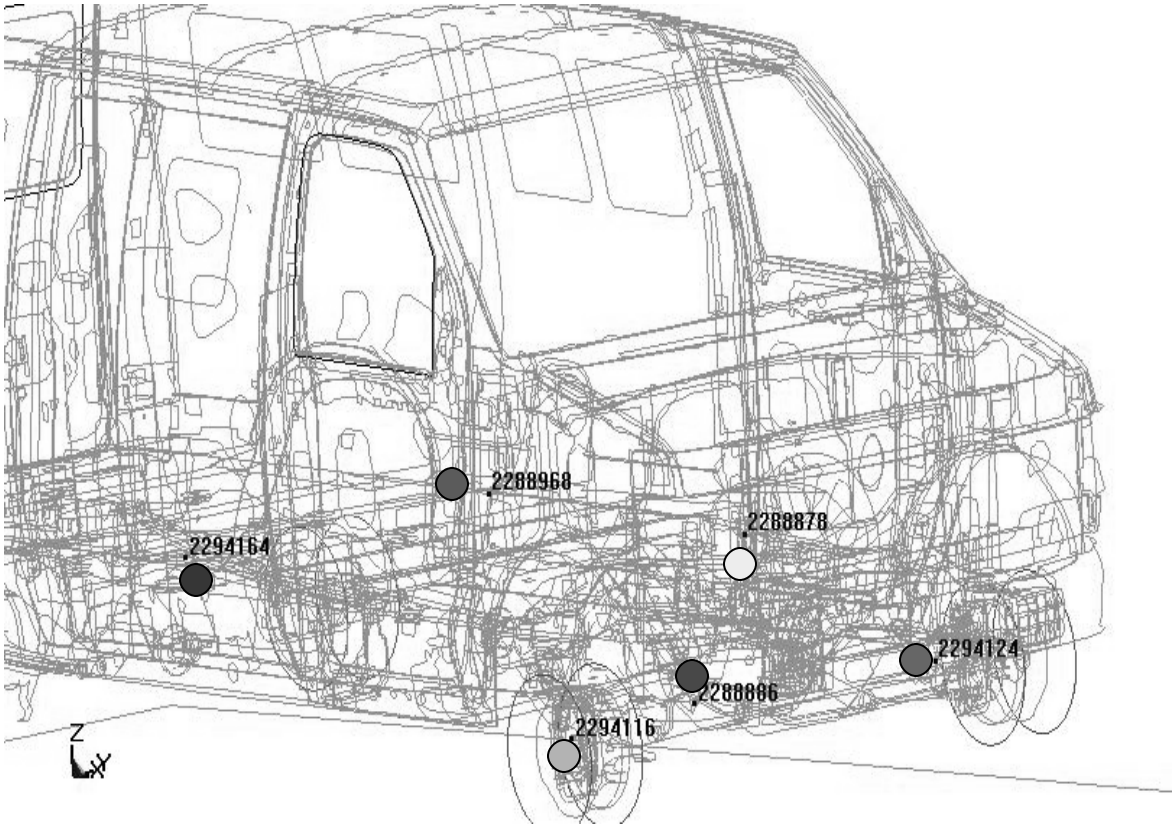
FHWA / NHTSA National Crash Analysis Center
The George Washington University

1998 Ford Econoline - Finite Element Model



File: Econoline.key	
Number of Parts	- 438
Number of Nodes	- 295555
Number of Solids	- 15952
Number of Beams	- 2
Number of Springs	- 6
Number of mass elements	- 90
Number of Shells	- 278535
Number of Elements	- 300066

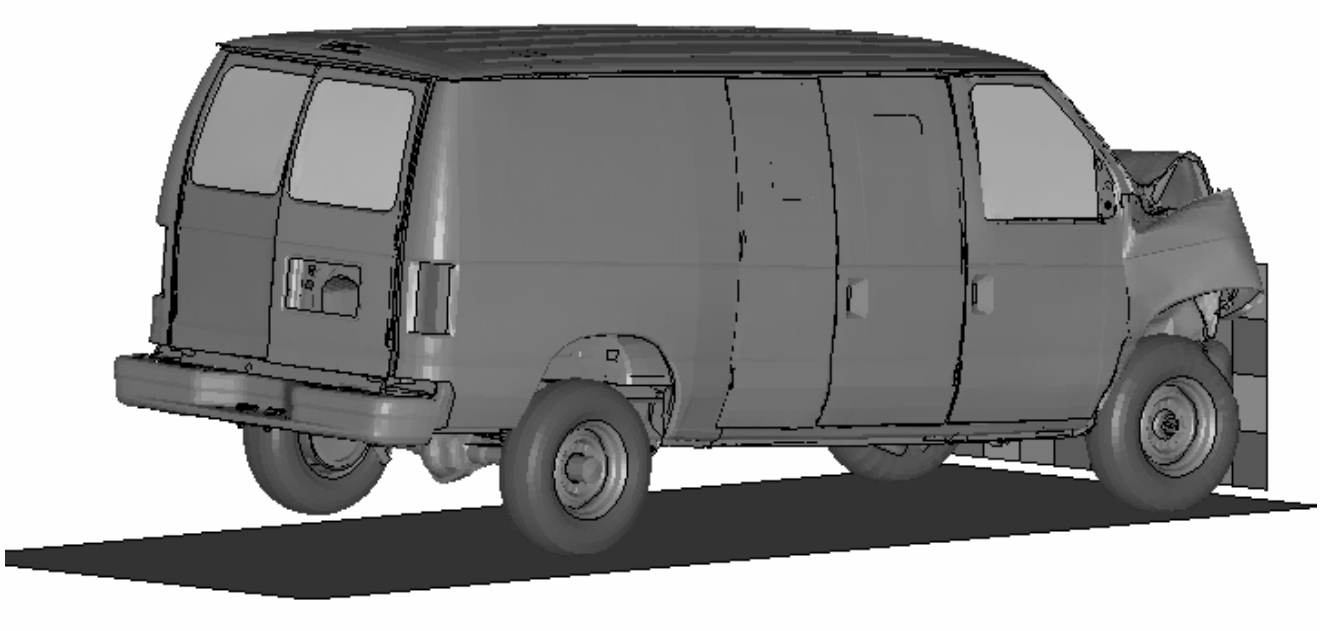
1998 Ford Econoline - Accelerometer Locations



Accelerometer Locations

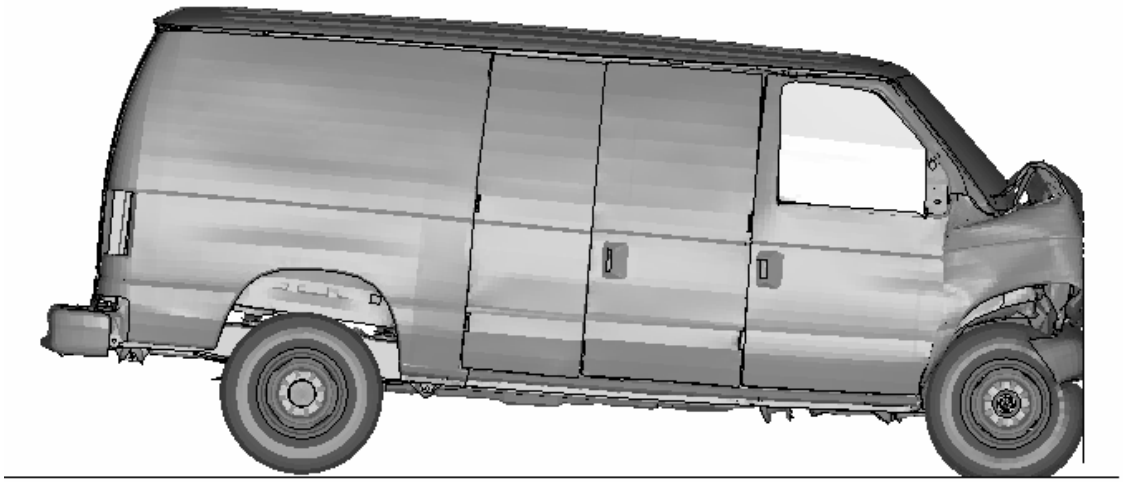
Left seat	2288968
Right seat	2294164
Engine Top	2288878
Engine Bottom	2288886
R brake caliper	2294116
L brake caliper	2294124

1998 Ford Econoline – 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: ~ 39 hrs (for 150 ms)
Number of CPU's : 4

1998 Ford Econoline – NCAP Comparison



	FE Model	Test Vehicle
Weight (Kgs)	2131	2441
Engine Type	5.4L V8	4.2L V8
Tire size	LT245/75 RX16E	P235/75 R15
Attitude (mm) As delivered	F - 922	F - 828
	R - 968	R - 866
Wheelbase (mm)	3523	3505
CG (mm) Rearward of front wheel C/L	1585	1637

1998 Ford Econoline FE Model Correlated to 1999 Ford Econoline NCAP Test

Test No.: 3021
Contract or Study Title: 1999 FORD ECONOLINE INTO FLAT FRONTAL BARRIER (Load cell wall)
Test Performer: Karco Engineering
Test Reference No.: KAR99001-13
Test Type: NEW CAR ASSESSMENT TEST
Test Configuration: VEHICLE INTO BARRIER
Closing Speed (kph): 56.3
Impact Angle (degrees): 0
Offset Distance (mm):
Version No.: 2
Test Objectives: OBTAIN 35 MPH NEW CAR ASSESSMENT AND RESEARCH DATA
Test Date: 2/4/1999
Contract No.: DTNH22-97-D-02007
Test Track Surface: CONCRETE
Test Track Condition: DRY
Ambient Temperature (degrees Celsius): 0
Type of Recorder: FM MULTIPLEXOR TAPE RECORDER
Total No. of Curves: 83
Test Commentary: THIS IS A 1999 TEST

1998 Ford Econoline – NCAP Test Vehicle Data

TEST VEHICLE INFORMATION			
Manufacturer	FORD	VIN	1FTRE1423XHA52552
Manufacturing Date	12/98	Delivery Date	1/22/99
Dealer	FAIRVIEW FORD	NHTSA NO.	MX0208
Odometer Reading	49.0 mi	Fuel Type	UNLEADED
Engine Displacement	4.2 liters	Cylinders	8
Transmission	AUTOMATIC	Final Drive	REAR
Engine Displacement	LONGITUDINAL	Color	SILVER
Tire press/Max.cap.front	28.3 Kpa	Cold tire press front	28.3 Kpa
Tire press/Max.cap.rear	28.3 Kpa	Cold tire press rear	28.3 Kpa
Recommend Tire Size	P235/75/R15	Type of spare	P235/75/R15
Tire Size on Vehicle	P235/75/R15	Manufacturer	MICHELEN
GVWR	3039 Kg	Cargo Capacity	136 Kg
GAWR Front	1469 Kg	GAWR Rear	1723 Kg
Air Conditioning	YES	Power Steering	YES
Power Brakes	YES	AM/FM/Cassette	NO
Disc Brakes (Front)	YES	Disc Brakes (Rear)	NO
Power Windows	NO	Tilt Steering	NO
Anti-lock brakes (ABS)	YES	Power Seats	NO
Driver Airbag	YES	Passenger Airbag	YES

1998 Ford Econoline – NCAP Test Vehicle Data

Data Sheet No. 2... (Continued)

VEHICLE CAPACITY WEIGHT (kg):

Vehicle Capacity Weight	372 kg
Occupant Weight	136 kg
Rated Cargo/Luggage Weight (RCLW)	136 kg

	FRONT	REAR	TOTAL
Right	611	483	1094
Left	606	459	1065
Total	1217	942	2159
Percent of Total	56.3	43.7	100%

CALCULATION OF TEST TARGET WEIGHT (kg):

Total Delivered Weight	2159 kg
RCLW	136 kg
Weight of 2 P572 ATDs	152 kg
TARGET TEST WEIGHT	2447 kg

TEST WEIGHT OF VEHICLE WITH 2 ATDs AND BALLAST

	FRONT	REAR	TOTAL
Right	649	569	1218
Left	652	571	1223
Total	1301	1140	2441
Percent of Total	53.2	46.8	100%

Weight of Ballast secured in cargo area: 54 kg Does not include cameras, instrumentation, and brake abort system.

Vehicle Components Removed For Weight Reduction: Side mirrors, jack, tools, spare tire and paneling.

TEST VEHICLE ATTITUDE (mm)

	LF	RF	LR	RR
As Delivered	830	825	870	862
As Tested	813	810	834	837

Vehicle Wheelbase: 3505 mm

FUEL SYSTEM DATA:

Fuel System Capacity From Owner's Manual = 132.4 liters

Usable Capacity Figure Furnished by COTR = 132.4 liters

Test Volume Range (92 to 94% of Usable Capacity) = 121.8 to 124.5 liters

ACTUAL TEST VOLUME = 123.2 liters (With entire fuel system filled)

Test Fluid Type = Stoddard Solvent **Specific Gravity =** 0.764

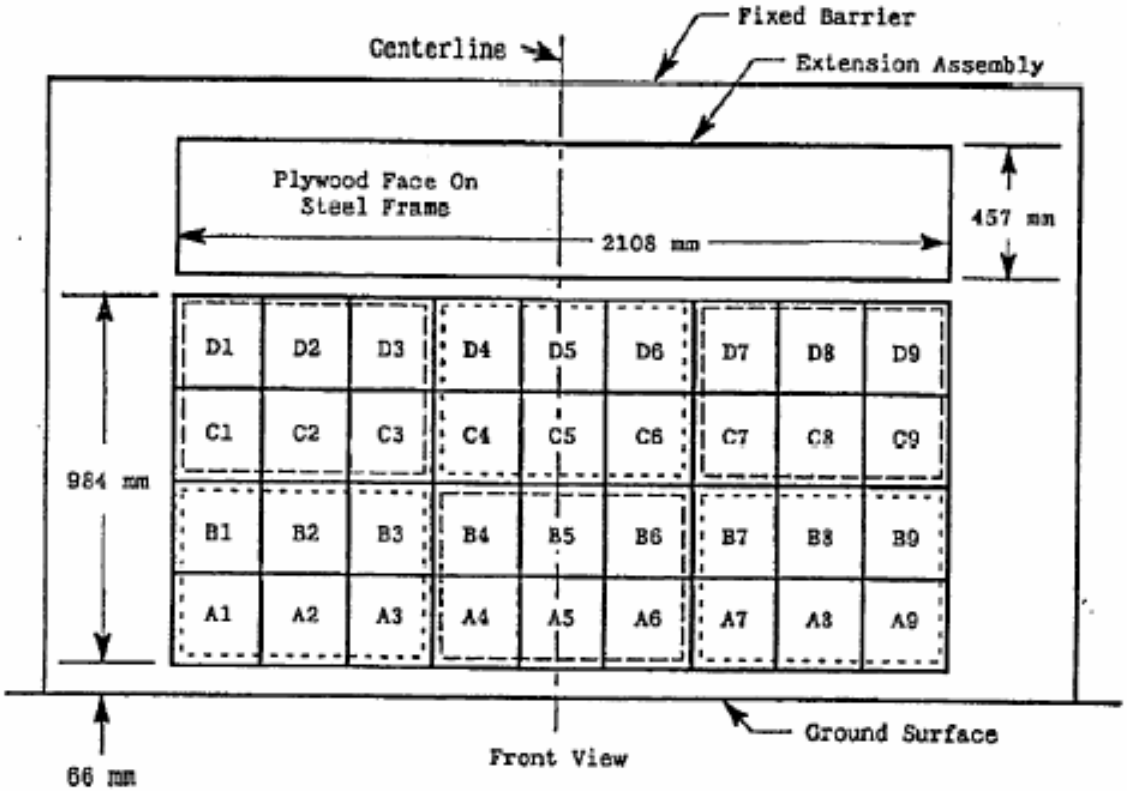
Kinematic Viscosity = as per ASTM Standard D484-71 **Color =** Red

Type of Fuel Pump = Electric X Mechanical ____

Does electric pump operate with ignition switch "ON" & engine "OFF"? Yes X No ____

DETAILS OF FUEL SYSTEM: Key operated w/automatic shut off after a few seconds.

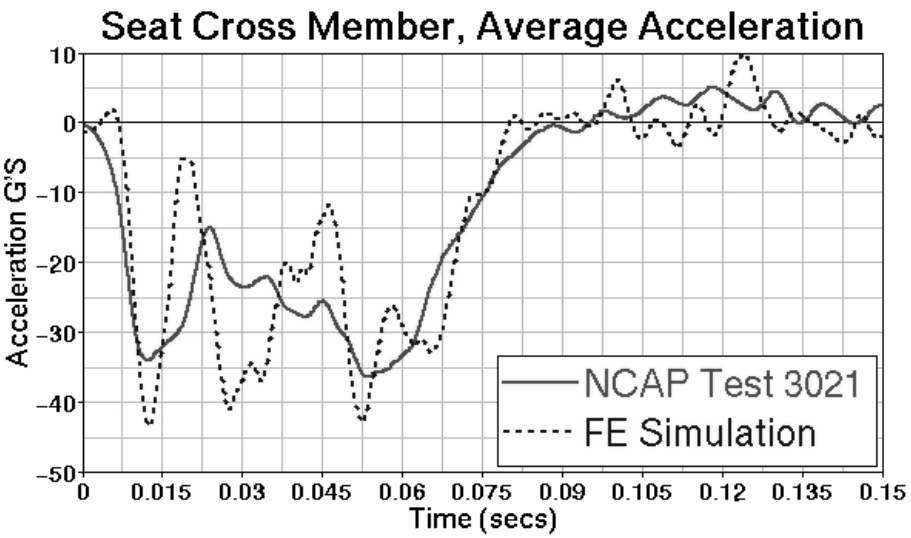
1998 Ford Econoline – NCAP Load Cell Wall

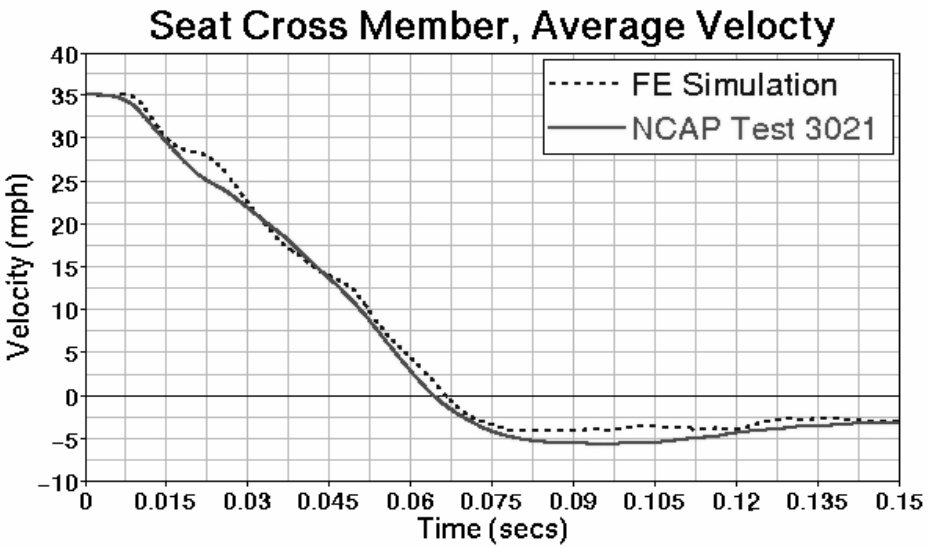


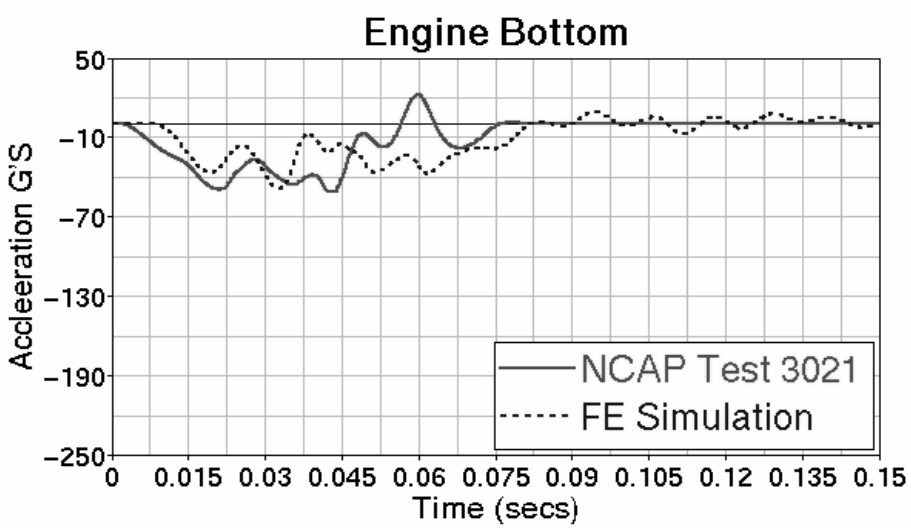
6 GROUPS OF 6 LOAD CELLS EACH

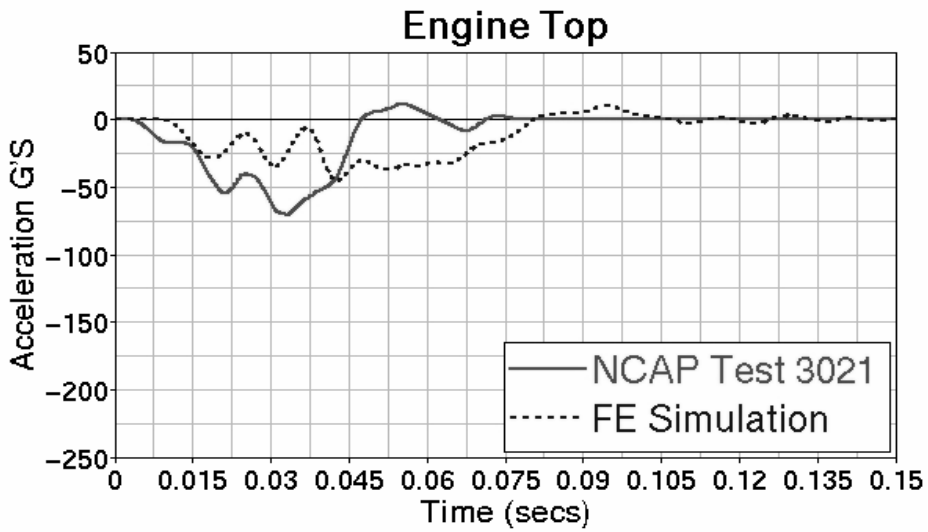
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

1998 Ford Econoline – NCAP Test Accelerometer Data





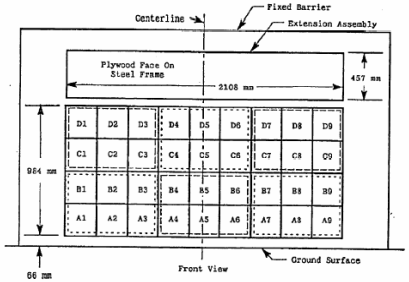


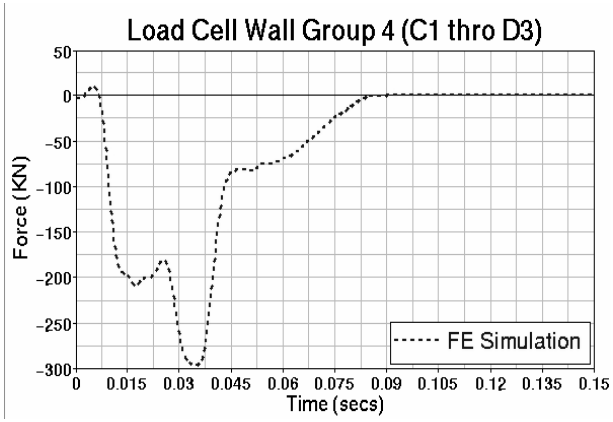


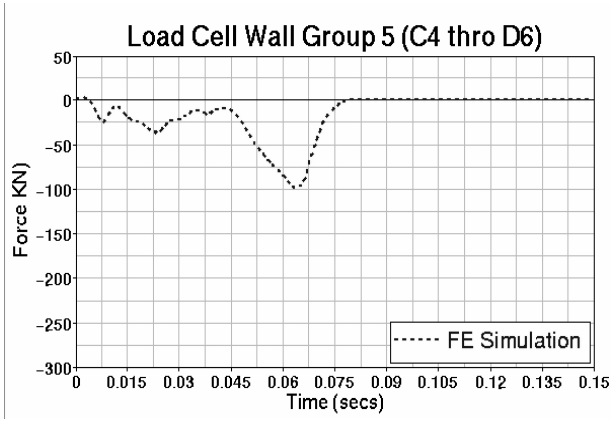
1998 Ford Econoline – NCAP Test Load Cell Data

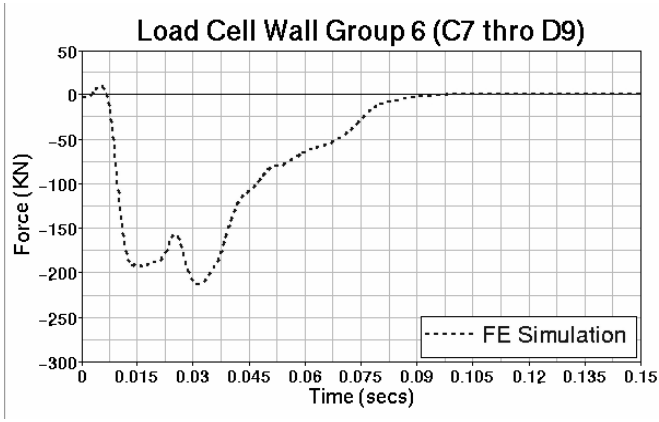
6 GROUPS OF 6 LOAD CELLS EACH

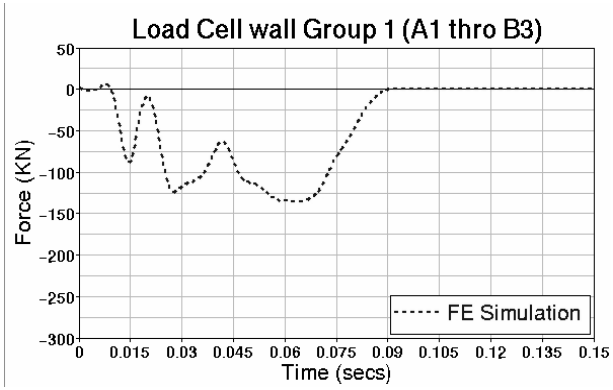
Group 4 C1 thru D3	Group 5 C4 thru D6	Group 6 C7 thru D9
Group 1 A1 thru B3	Group 2 A4 thru B6	Group 3 A7 thru B9

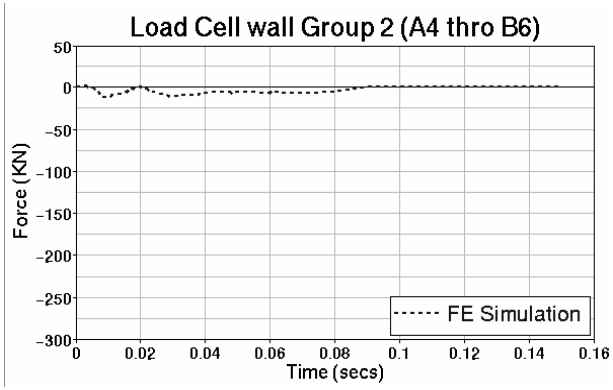


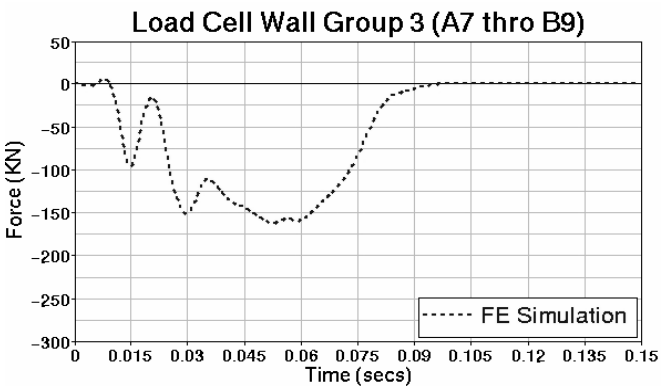




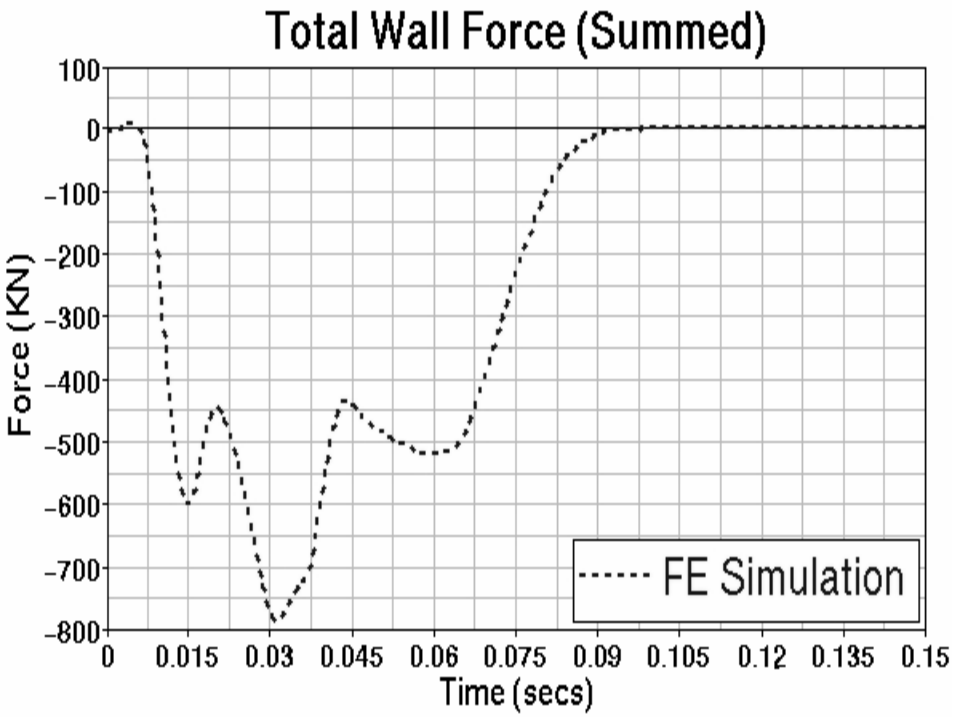


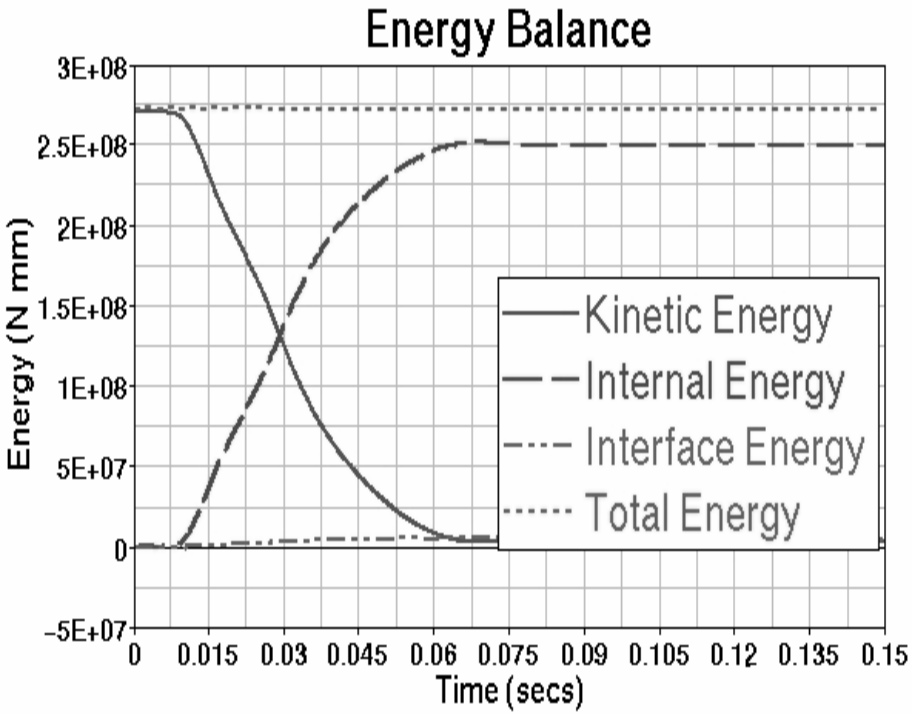






1998 Ford Econoline – NCAP Total Wall Force & Energy Balance





1998 Ford Econoline – 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)