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Lincoln Navigator Compatibility Test Series

SAE Government Industry Meeting

May 13, 2003

Test Program

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- **Evaluate effect of Navigator redesign on crash partner**
  - Full frontal engagement, both vehicles 30 mph
  - 2003 and 1999, 4 door Lincoln Navigators
- **2 V-to-V tests with 1996 Dodge Neon**
  - Evaluate injuries and deformations in crash partner
  - Did vehicle redesign affect safety in crash partner ?
- **2 LCMDB-to-V tests**
  - Adjust LCMDB to match Neon weight
  - Do load cell measures reflect the V-to-V tests ?
- **2 Vehicle to Barrier tests**
  - Conducted by Ford and MIRA

Status

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- **V-to-V tests conducted in October**
- **High resolution barrier testing conducted in March**
  - MIRA 50 by 50 mm load cell barrier
  - Detailed analysis still underway
- **LCMDB to vehicle tests underway**
  - Tests to be conducted this week or next

Pre Test Alignment

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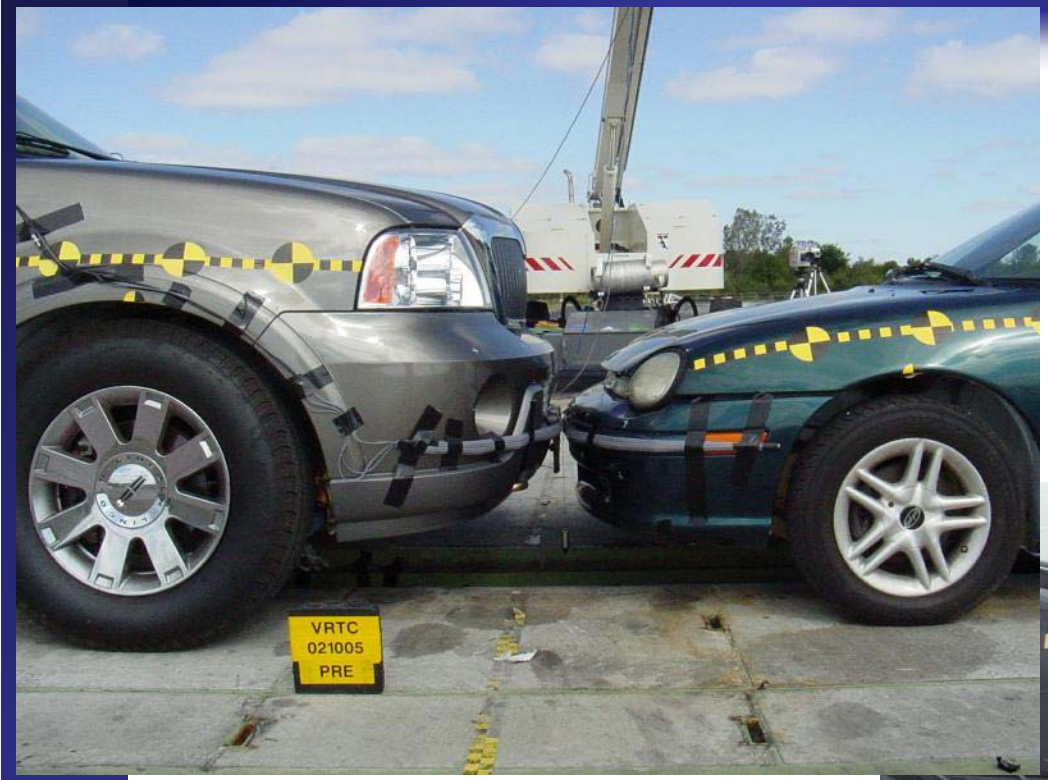

2003 Navigator
3027 kg / 1398 kg
NHTSA Test 4430

1999 Navigator
2873 kg / 1378 kg
NHTSA Test 4429

1999 Navigator

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2003 Navigator

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Post Test

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2003 Navigator

1999 Navigator

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2003 Navigator post test

1999 Navigator post test

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1996 Neon struck
by
2003 Navigator

1996 Neon struck
by
1999 Navigator

Neon Driver Injury Criteria

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Criteria	1999 Navigator	2003 Navigator
HIC15	**327**	**735.6**
Chest G	**64.5**	**68.1**
Chest Deflection	**42.8 mm**	**27.9**
Max Nij	**0.37 (TE)**	**0.40 (TE)**
Femur	**10,094 (left)**	**7053 (left)**
Tibia Index	**0.92 (upper left)**	**1.33 (upper right)**

Intrusion Measurements

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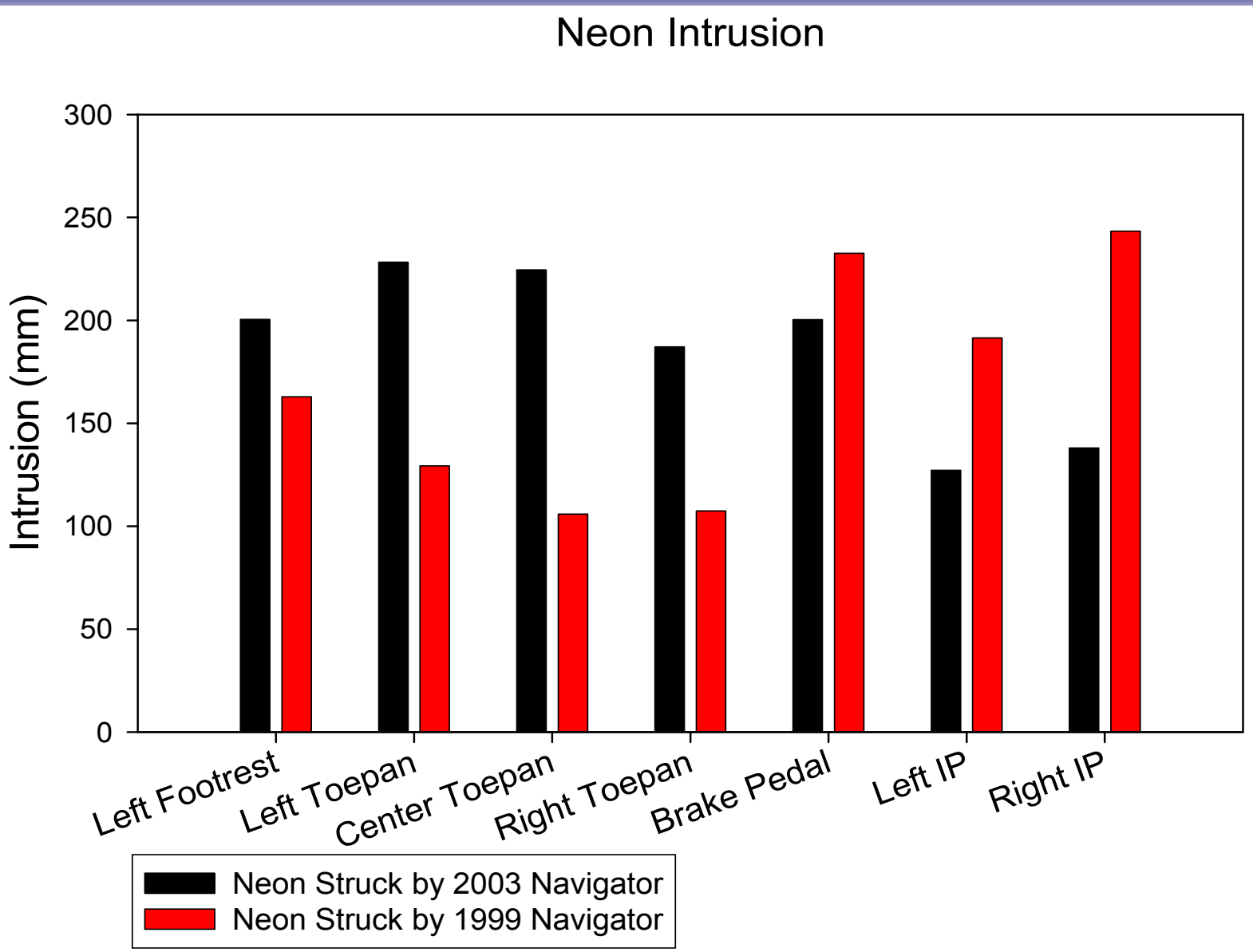
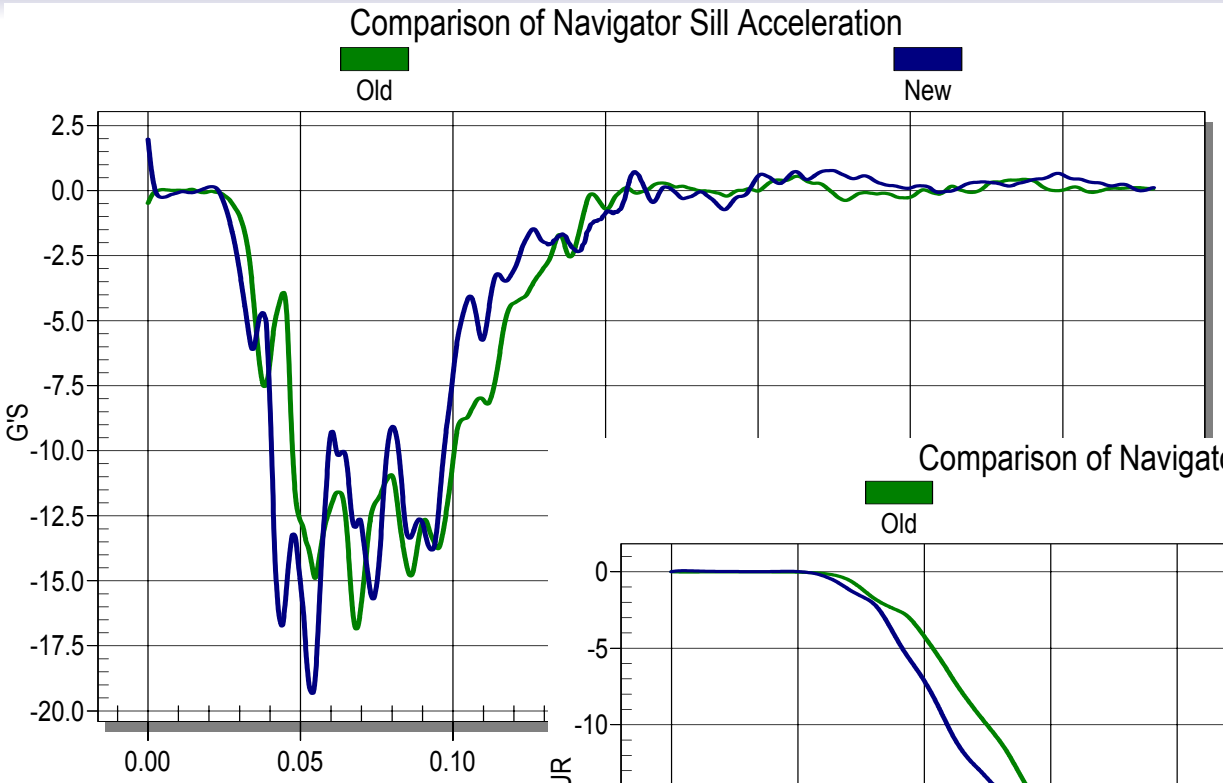
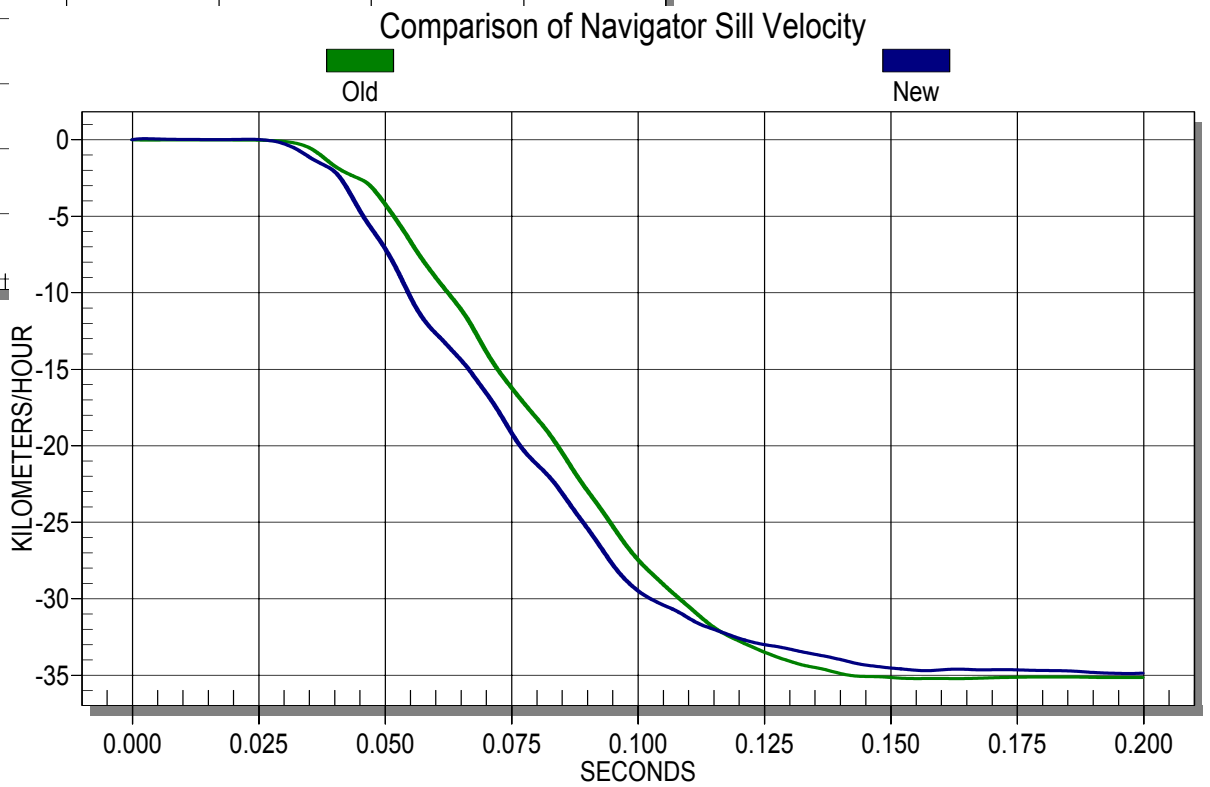
- **Toepan intrusion measurements were higher for the Neon struck by the 2003 Navigator**
  - Instrument panel intrusions were higher for the Neon struck by the 1999 Navigator
- **Toepan intrusions were low for both Navigators**
  - Intrusions measured on 2003 Navigator were consistently lower

Intrusion Measurements



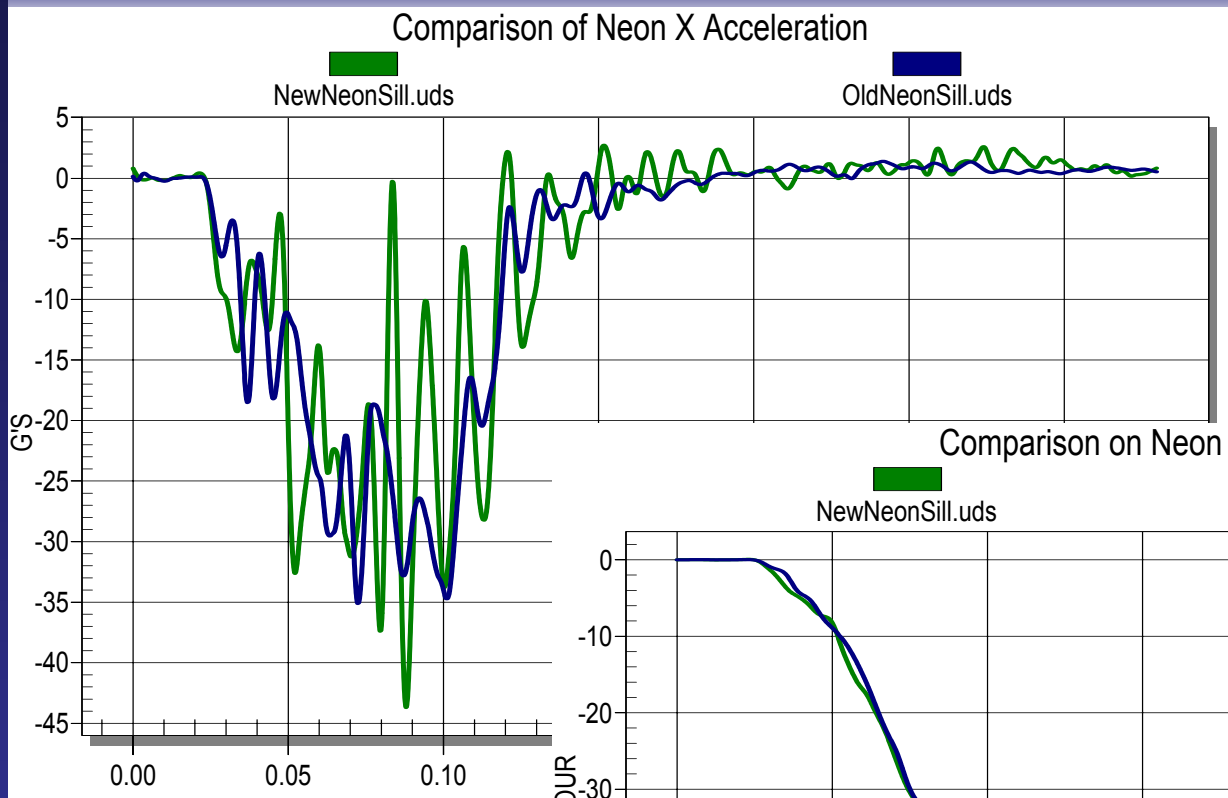
Navigator Acceleration

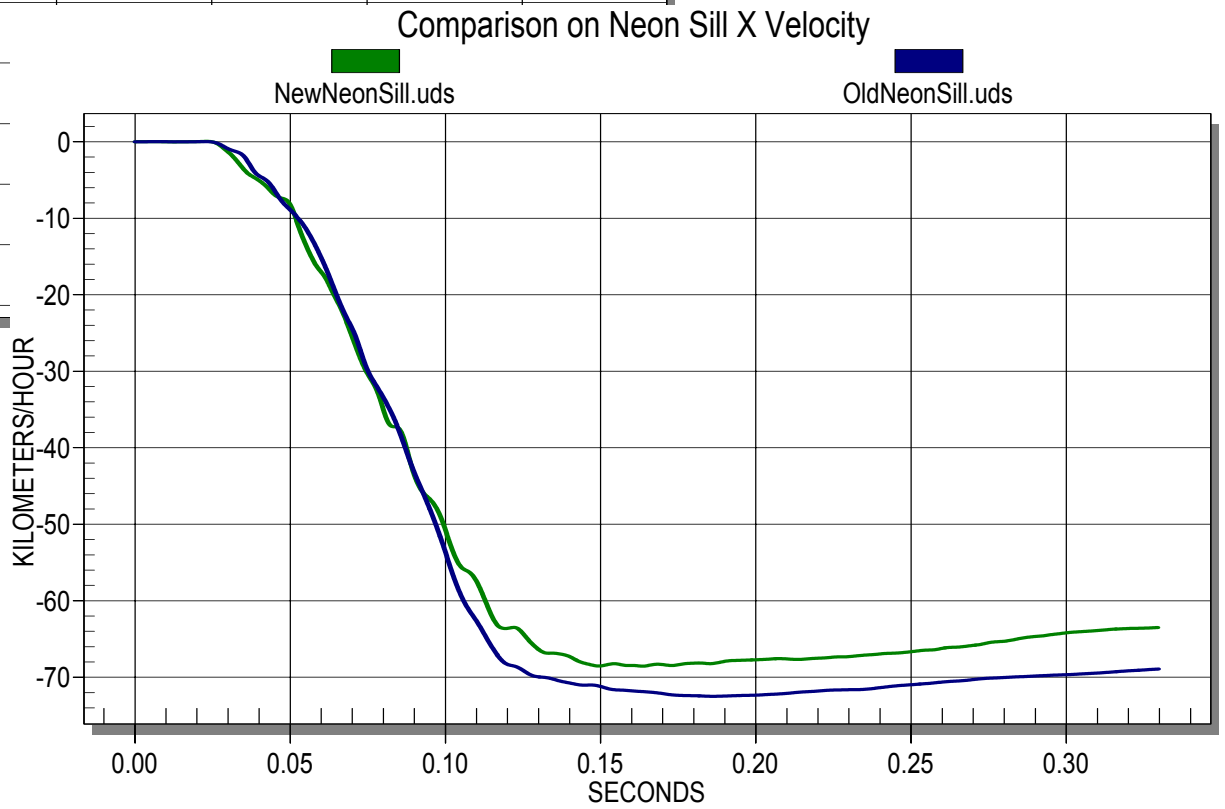




1999 Navigator decelerated a little later

Neon Acceleration Data





Neon Measurements were similar

Vehicle Stiffness

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- **No frontal NCAP tests for Lincoln Navigator**
  - Several tests exists for Ford Expedition
  - 2003 Expedition is somewhat “stiffer” than previous models
- **2003 Expedition test conducted on low resolution barrier (MGA)**
  - Cannot compare average height of force

Force Deflection

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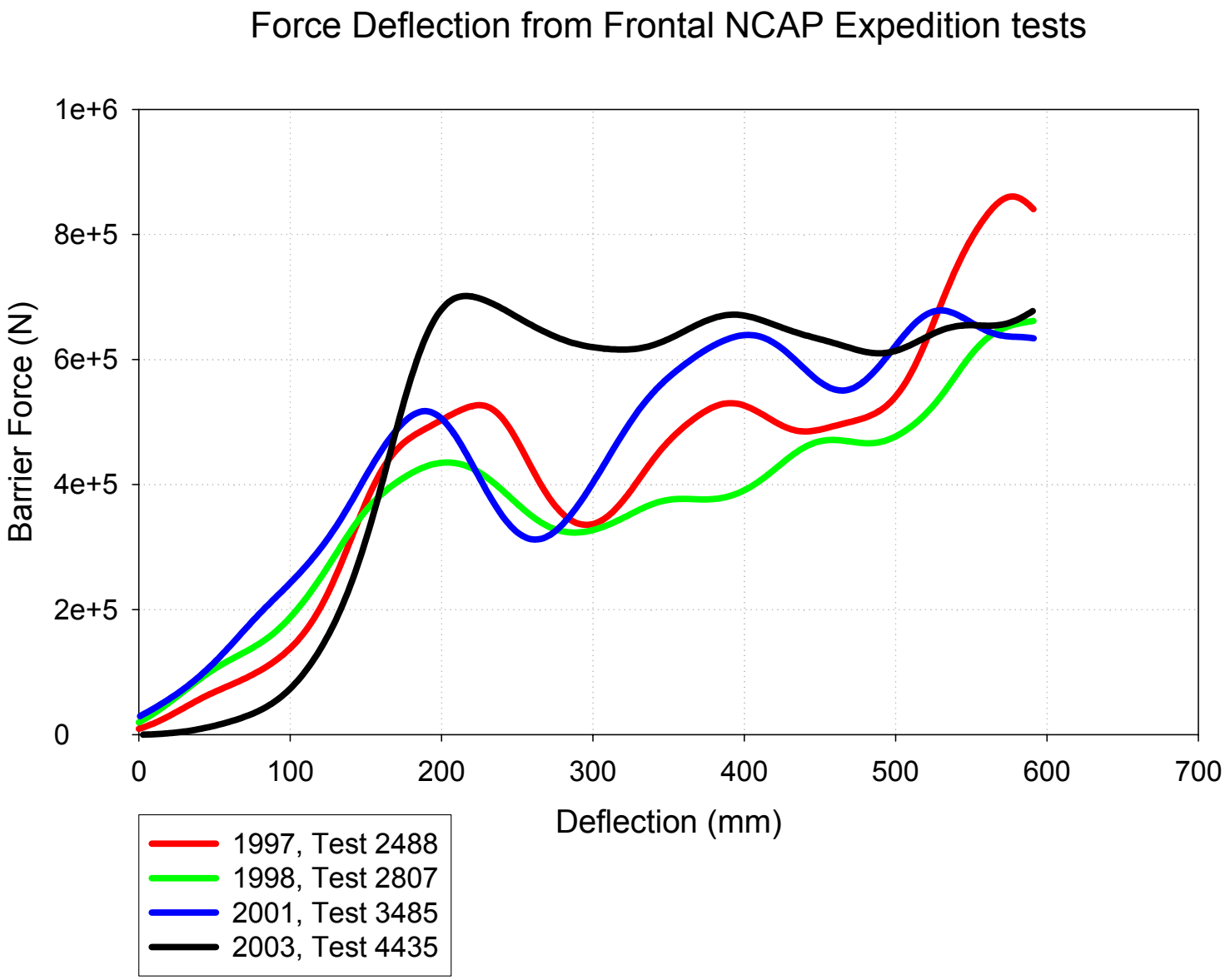

NHTSA Test Plans

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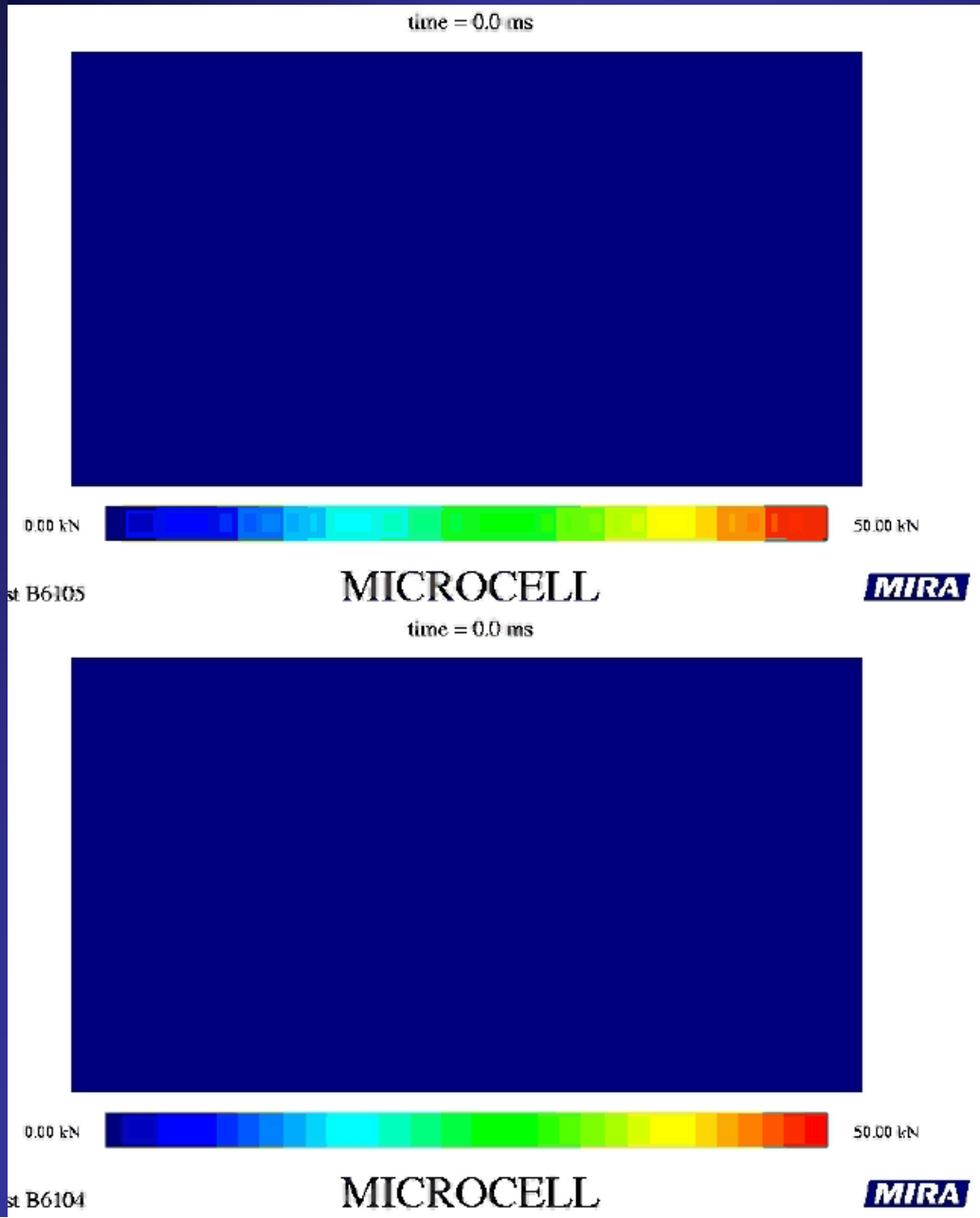
- **LCMDB-to-Vehicle tests underway**
  - 214 MDB faces without bumper element
  - 30 mph, both vehicles moving
  - To evaluate if the LCMDB can measure a difference in performance commensurate with the performance in V-to-V testing
- **New load cell wall being purchased**
  - 125 by 125 mm resolution
  - Delivery and preliminary testing expected by the end of summer

Ford / MIRA Load Cell Data



Crash tests were conducted at MIRA using their high resolution load cell wall

Software currently being finalized to evaluate compatibility metrics (AHOF, homogeneity, etc)

Load cell Analysis Software

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- **Software available to evaluate NCAP load cell data from NHTSA web site**
  - Plots load contours, AHOF, etc.
    - Can save plots, avi's, test data to local PC
  - Runs on local PC, downloads test data from internet
    - Requires MS Windows XP, 2000, ME or 98
  - http://www-nrd.nhtsa.dot.gov/software/load-cell-analysis
    - NHTSA.dot.gov -> Research -> R&D Software -> LoadcellAnalysis
    - Just released, feedback needed
    - 56k modem takes ~1 minute to load a test