

# Humanetics Update to BioRID II GTR/TEG



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# Agenda

- ▶ Inspection test change
- ▶ Head Restraint Probe selection
- ▶ Certification Test Development
  - Plan
  - Timeline

# Request Change to Inspection Checklist

## ▶ CHECK CERVICAL VERTEBRAE HOLES FROM EACH SIDE OF VERTABRA:

- 8.0000 +.0010/-.0000 MM SHOULD GO IN USING LIGHT, SINGLE FINGER FORCE.
- 8.0300 +.0010/-.0000 MM SHOULD NOT GO IN USING LIGHT, SINGLE FINGER FORCE.

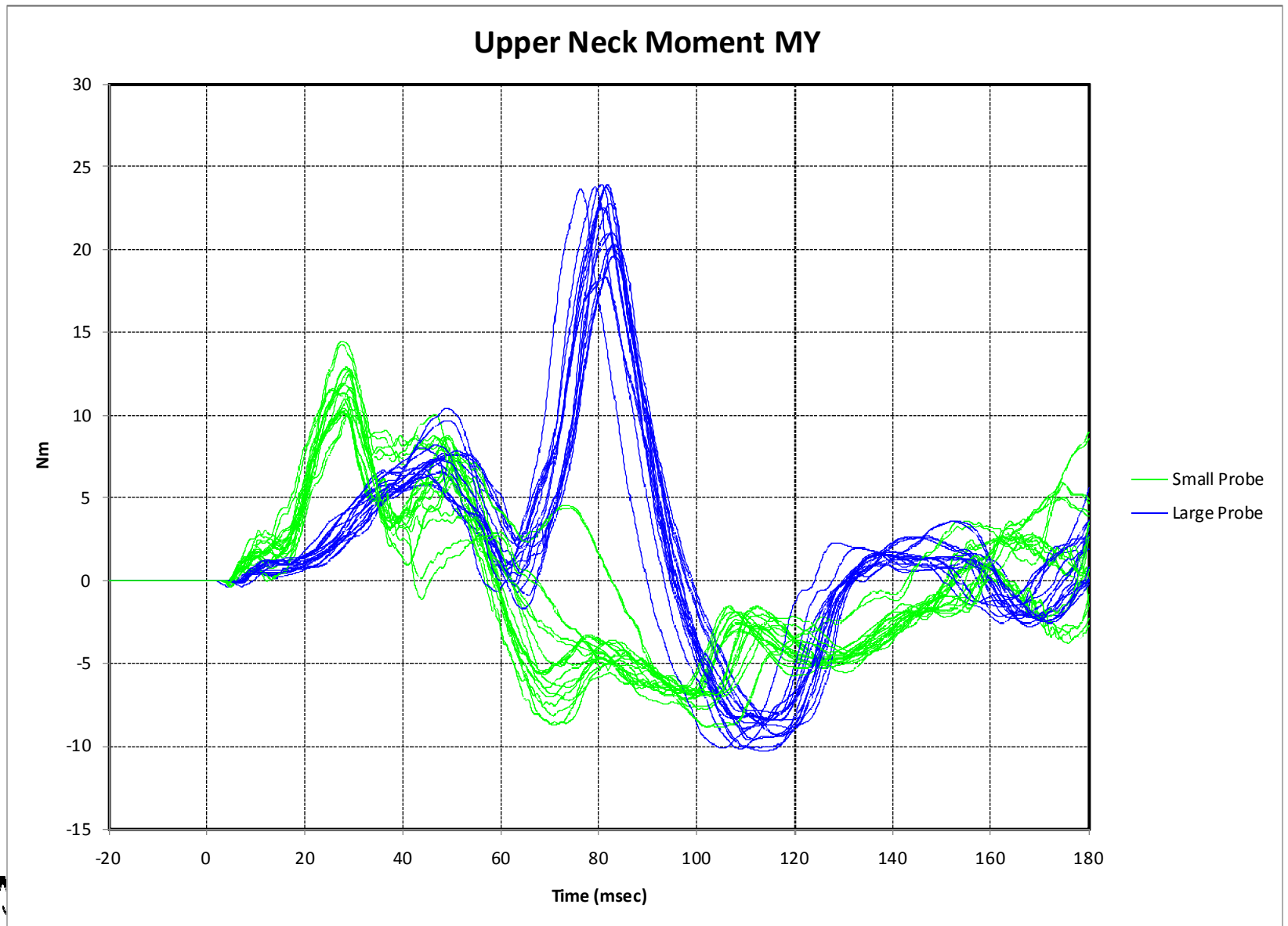
## ▶ Changes

- Tighter class pins
- Use tolerances instead of pin classes to define pins
- Adjust pin sizes slightly due to change in class pin

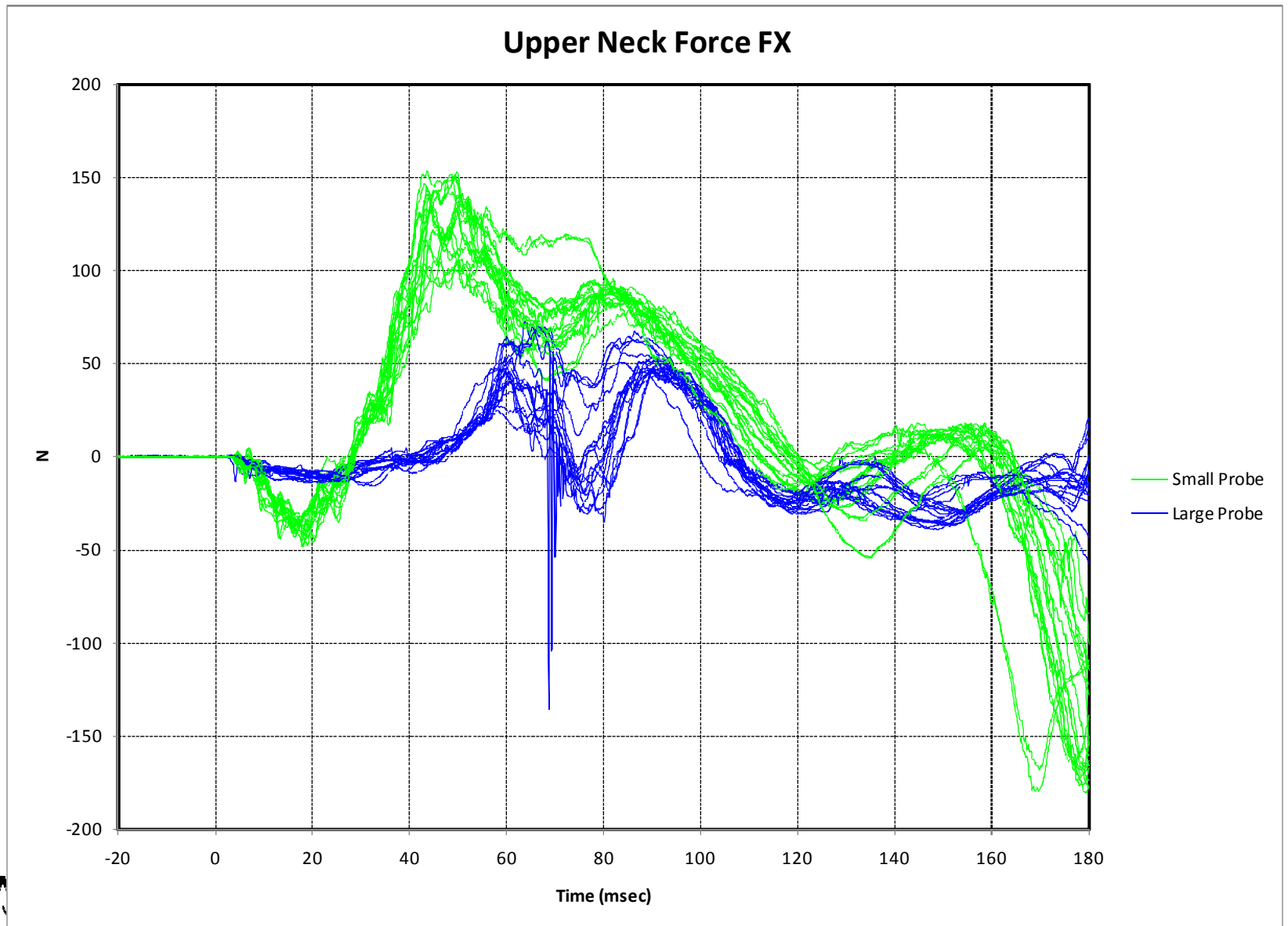
# Head Restraint Probes

- ▶ Tested 7 dummies with large and small head restraint probes
- ▶ Probes give different responses
- ▶ No indication that one is better than other
  - haven't found a problem with either one on these dummies

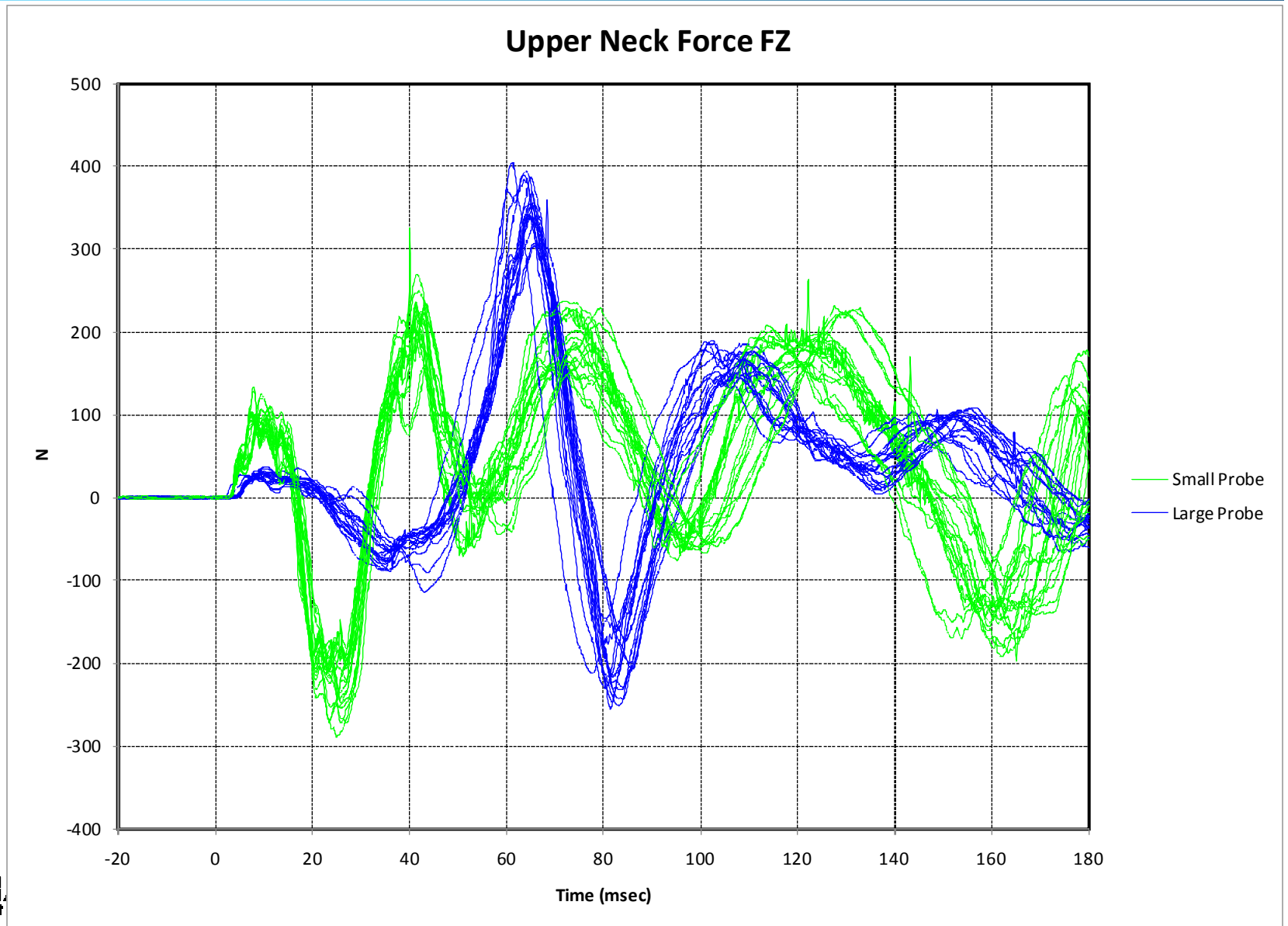
# Head Restraint Probes



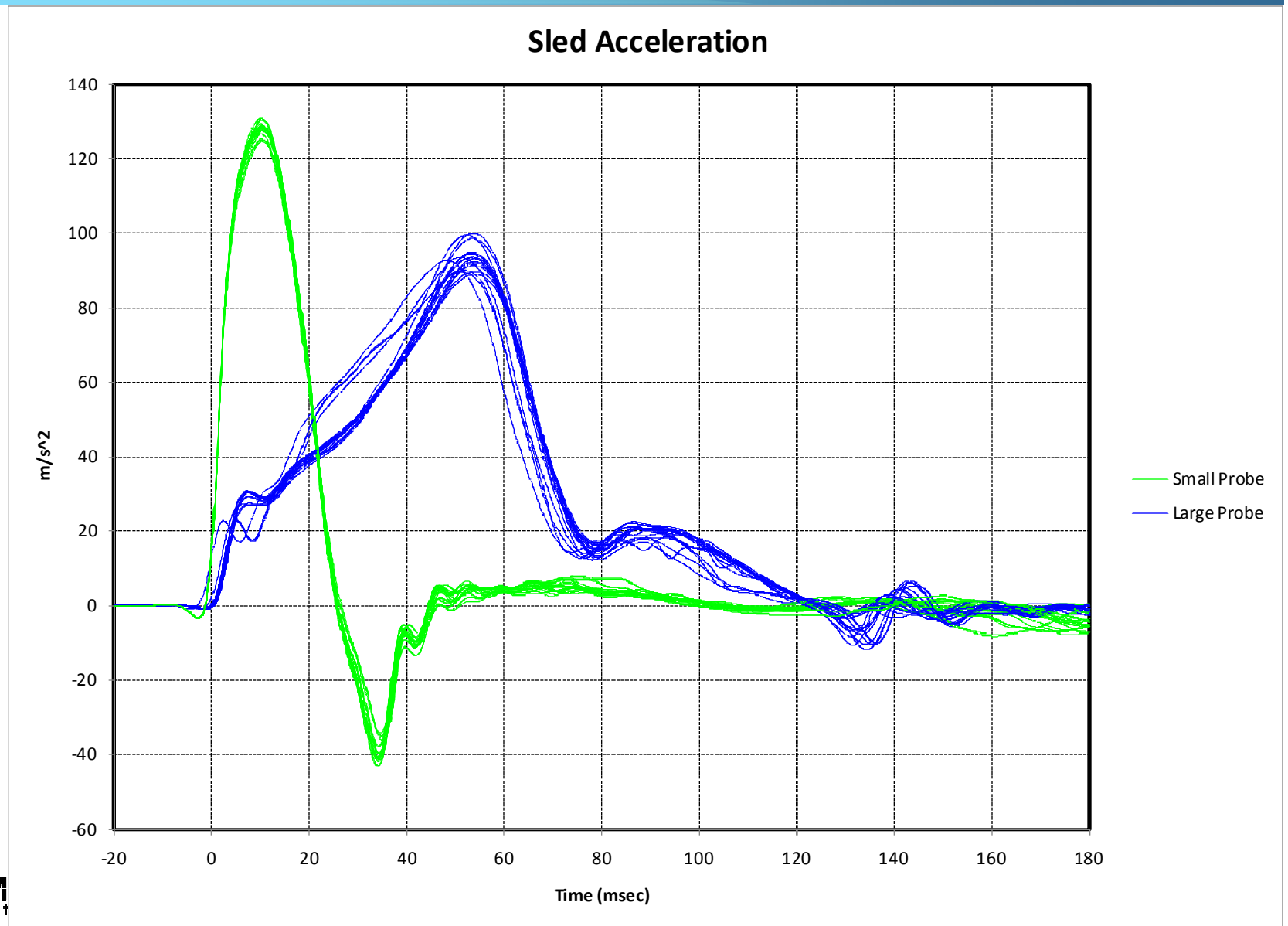
# Head Restraint Probes



# Head Restraint Probes



# Head Restraint Probes





# Head Restraint Probes

- ▶ Back to philosophical discussion
  - Small probe much easier for lab to use
    - ▶ No probe changes or handling
    - ▶ Only one ETD to certify
  - Large probe gives responses closer to car seat data
    - ▶ Similar acceleration to car seat testing
    - ▶ Similar Upper neck forces/moments to car seat testing
- ▶ ***Need to choose!***

# Certification Development Plan

- ▶ Collect data on dummy population
  - Collect 50+ dummies
  - 5+ labs
  - Tests needed
    - ▶ ***Must do checklists!*** This is part of certification
    - ▶ Certification without head restraint
    - ▶ Certification with head restraint
    - ▶ Sled weight package verification tests
    - ▶ Jacket tests
    - ▶ Head rest foam verification tests

# Certification Development Plan

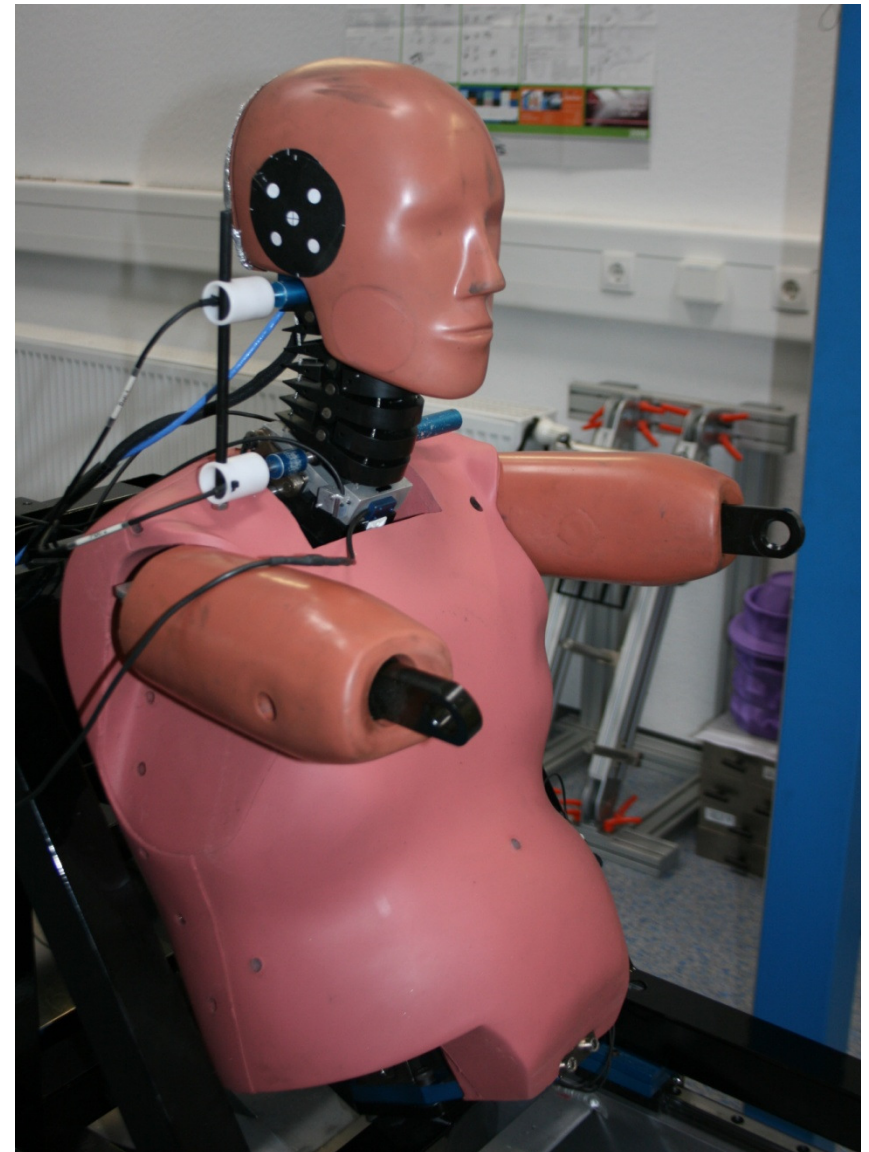
- ▶ Lab to Lab round robin
  - Purpose
    - ▶ Measure within lab repeatability
    - ▶ Measure lab to lab reproducibility
  - Plan
    - ▶ Build 2 dummies
    - ▶ Test in 4 laboratories
    - ▶ Run through each lab twice
    - ▶ Do all proposed tests

# Certification Development Plan

- ▶ Investigate PDB dummy differences
  - Try testing with upper arms
  - Work on new certification test possibilities
    - ▶ No back support (full spine motion)
    - ▶ Full rigid seat back
      - Multiple plates with load cells
      - Allow spine base to translate and rotate
      - Add arm mass simulators
      - Adjustable padded head restraint with load cell
    - ▶ OTHER?
  - Complete teardown and measurement of dummies

# Investigate PDB Dummies

- ▶ Run tests with and without head restraint with upper arms
- ▶ Both PDB dummies
- ▶ Look for  $M_y$ ,  $F_x$ ,  $F_z$  differences between dummies

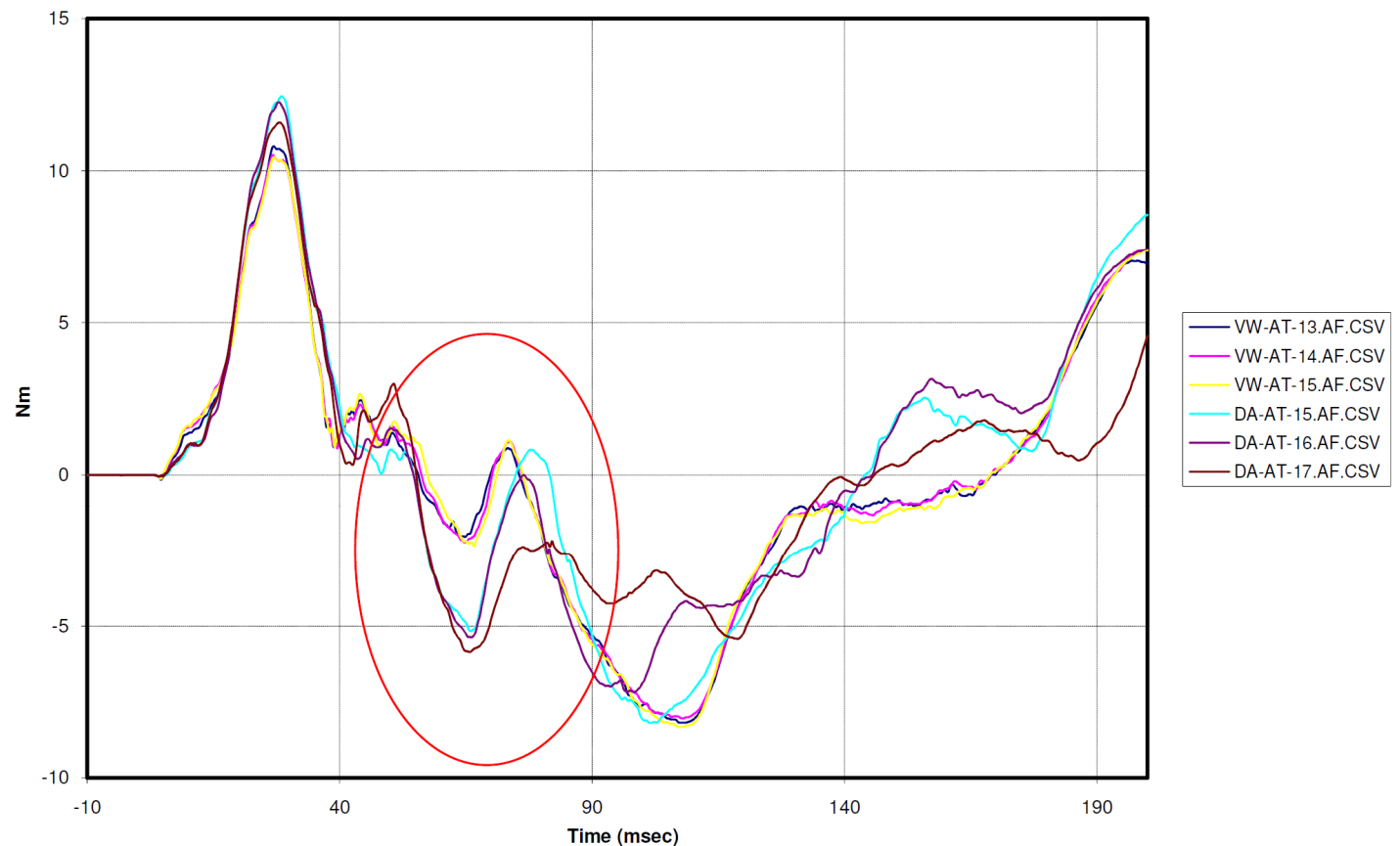


# Investigate PDB Dummies

## ► Preliminary result:

- Possible difference; inconclusive on next series
- Need more testing to investigate further

Upper Neck Moment MY



# Certification Development Plan

- ▶ Continue testing into other possible dummy variables
  - Spine setup variables
  - Bumper size and stiffness
  - Spring stiffness variables
  - Vertebra hole size/pin fits (thorax, lumbar)
  - Other?

# Certification Development Timeline

ID	Task Name	Start	Finish	Duration	1, 201	Qtr 2, 201	Qtr 3, 2011	Qtr 4, 201	Qtr 1, 201	Qtr 2, 201	Qtr						
					e	Mar	Apr	Ma	Jun	Jul	Aug	Se	Oct	Nov	De	Jan	e
0	<b>Dummy Variability Reduction Timeline</b>	<b>Mon 3/7/11</b>	<b>Fri 5/4/12</b>	<b>305 days?</b>													
1	Compare head restraint probes (large vs small)	Mon 3/7/11	Fri 6/10/11	70 days													
2	Joint investigation with PDB in Europe	Mon 4/18/11	Fri 4/29/11	2 wks													
3	Test dummies coming through Huron	Mon 3/7/11	Fri 5/27/11	3 mons													
4	Make decision at June meeting	Fri 6/10/11	Fri 6/10/11	1 day													
5	<b>Collect Data on Dummies, Multiple Labs</b>	<b>Mon 6/13/11</b>	<b>Thu 5/3/12</b>	<b>234 days</b>													
6	Ship head restraint test equipment to 4 labs (HIS Europe, HIS Nagoya, Ford, IIHS)	Mon 6/13/11	Fri 7/22/11	6 wks													
7	Collect all tests 50+ dummies that pass certification	Mon 7/25/11	Fri 12/9/11	5 mons													
8	<b>Create tentative corridors</b>	<b>Mon 12/12/11</b>	<b>Thu 2/2/12</b>	<b>39 days</b>													
15	<b>Try out new corridors</b>	<b>Fri 2/3/12</b>	<b>Thu 4/5/12</b>	<b>45 days</b>													
19	Update test procedure documents	Fri 4/6/12	Thu 5/3/12	4 wks													
20																	
21	<b>Measure repeatability and reproducibility of certification tests (GR&amp;R)</b>	<b>Mon 6/13/11</b>	<b>Mon 2/13/12</b>	<b>176 days?</b>													
22	Build 2 dummies spanning across corridors	Mon 6/13/11	Fri 8/19/11	10 wks													
23	Build 2 of each ETD spreading across corridors	Mon 6/13/11	Fri 7/22/11	6 wks													
24	<b>Round 1 (4 labs)</b>	<b>Mon 8/22/11</b>	<b>Mon 11/7/11</b>	<b>56 days?</b>													
34	<b>Round 2 (4 labs)</b>	<b>Tue 11/8/11</b>	<b>Mon 1/30/12</b>	<b>60 days</b>													
44	Analysis and reporting	Tue 1/31/12	Mon 2/13/12	2 wks													
45	<b>Investigate PDB dummy differences</b>	<b>Thu 6/2/11</b>	<b>Wed 12/28/11</b>	<b>150 days</b>													
46	<b>Try out new certification tests</b>	<b>Thu 6/2/11</b>	<b>Wed 12/14/11</b>	<b>140 days</b>													
47	Add upper arms in std and headrest tests	Thu 6/2/11	Wed 6/15/11	2 wks													
48	ship dummies to Huron	Thu 6/16/11	Wed 6/29/11	10 days													
49	<b>No back support test</b>	<b>Thu 6/30/11</b>	<b>Wed 7/27/11</b>	<b>20 days</b>													
53	<b>Multi-plate rigid back support w/lc</b>	<b>Thu 7/28/11</b>	<b>Wed 10/5/11</b>	<b>50 days</b>													
57	<b>Other?</b>	<b>Thu 10/6/11</b>	<b>Wed 12/14/11</b>	<b>50 days</b>													
61	Comprehensive teardown and measurement of all parts	Thu 12/15/11	Wed 12/28/11	2 wks													
62																	
63	<b>Testing to Investigate Possible Variation Factors</b>	<b>Mon 6/13/11</b>	<b>Fri 11/18/11</b>	<b>115 days</b>													
64	<b>Using certification tests</b>	<b>Mon 6/13/11</b>	<b>Fri 8/26/11</b>	<b>55 days</b>													
70	Investigate largest factors in car seat testing (volunteers?)	Mon 8/29/11	Fri 11/18/11	3 mons													
71																	
72	Release new corridors and updated test procedures	Fri 5/4/12	Fri 5/4/12	1 day													