

Informal document **GRSP-51-38**

(51st GRSP, 21 – 25 May 2012,
agenda item 20)

~~GRSP Inf. Group on Child Restraint Systems~~
~~CRS-31-08~~

~~April 11th, 2012~~

Comparison of CRS Side Impact Test Results Using by Acceleration Type Sled and Deceleration type Sled

JASIC / Japan



Background & Purpose

- ✓ NTSEL (type approval test department in Japan) has the acceleration type sled test system. So it is necessary to compare the CRS side impact sled test results between tested by deceleration type sled system and tested by acceleration type sled test system.
- ✓ We done CRS side impact sled tests by acceleration type sled test system and confirm to compare the test severity between deceleration sled and acceleration sled.

Concept of CRS Side Impact Test Using by Acceleration Type Sled System

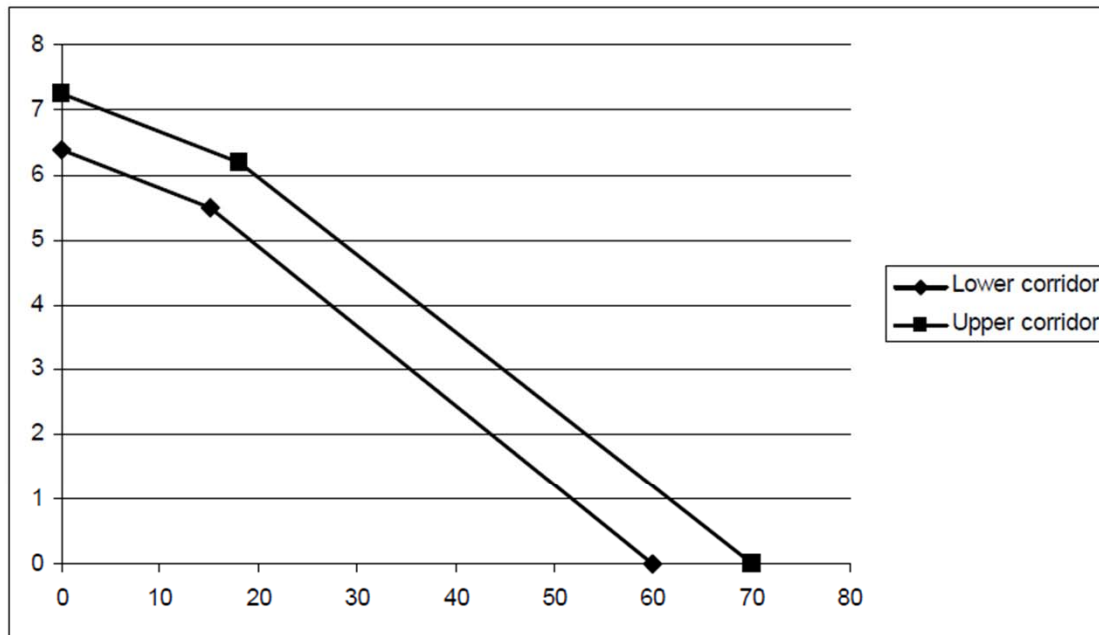


Parameters of New Side Impact Test

Relative velocity between door and sled

Curve of relative velocity between trolley and door panel as function of time

Lateral Impact – Test velocity corridor 3



Door intrusion

Figure 1
Door panel geometry and position at T0 – Top View

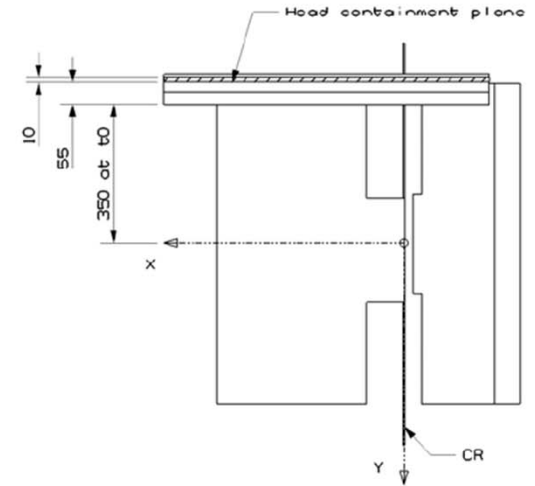
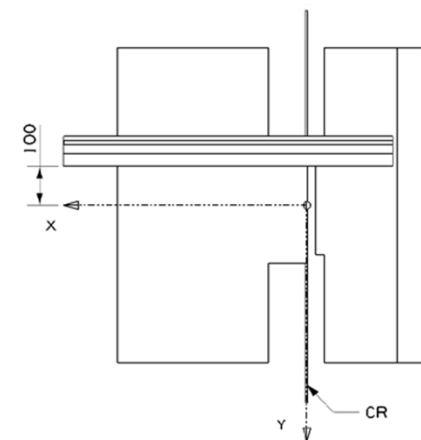


Figure 3
Door panel approximate maximum intrusion – Side View (For information)



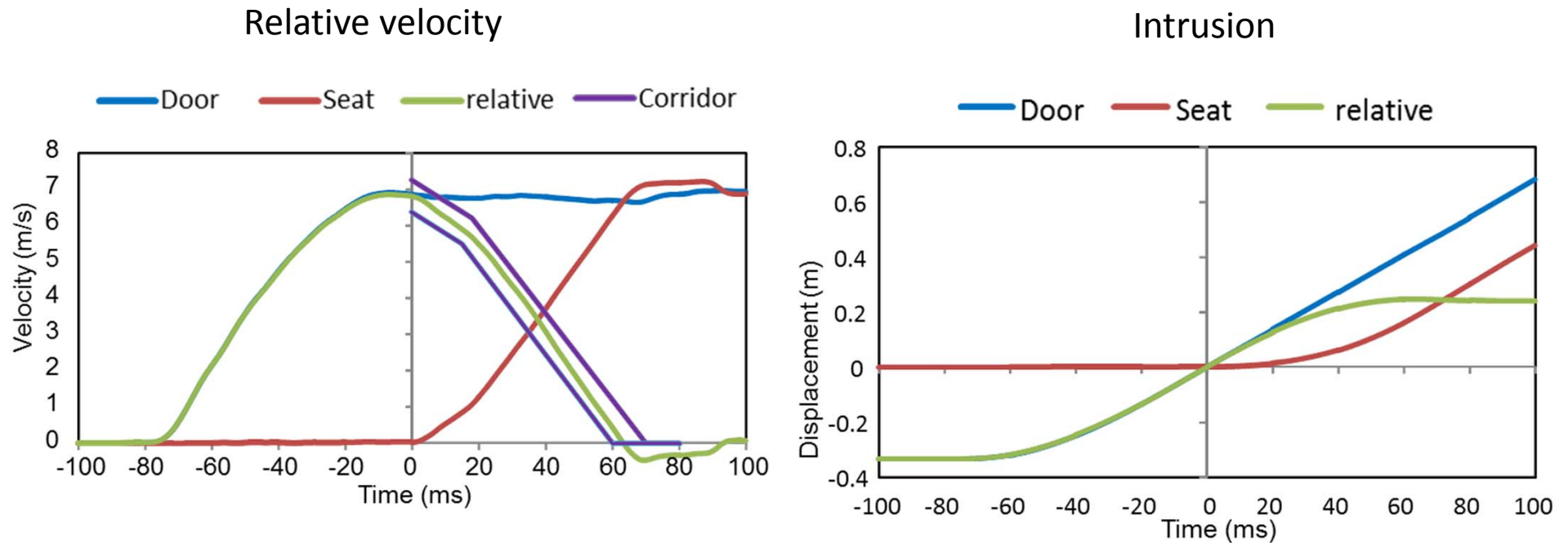
Photos before sled tests



Video



Test Concept



In this test concept, door moved with sled and seat moved on sled on sled.

Comparison of Test Results Using by Acceleration Type Sled System and Deceleration Type Sled System



Tested CRS

CRS A



CRS B



CRS A is Group I TT CRS and
CRS B is Group I SL CRS

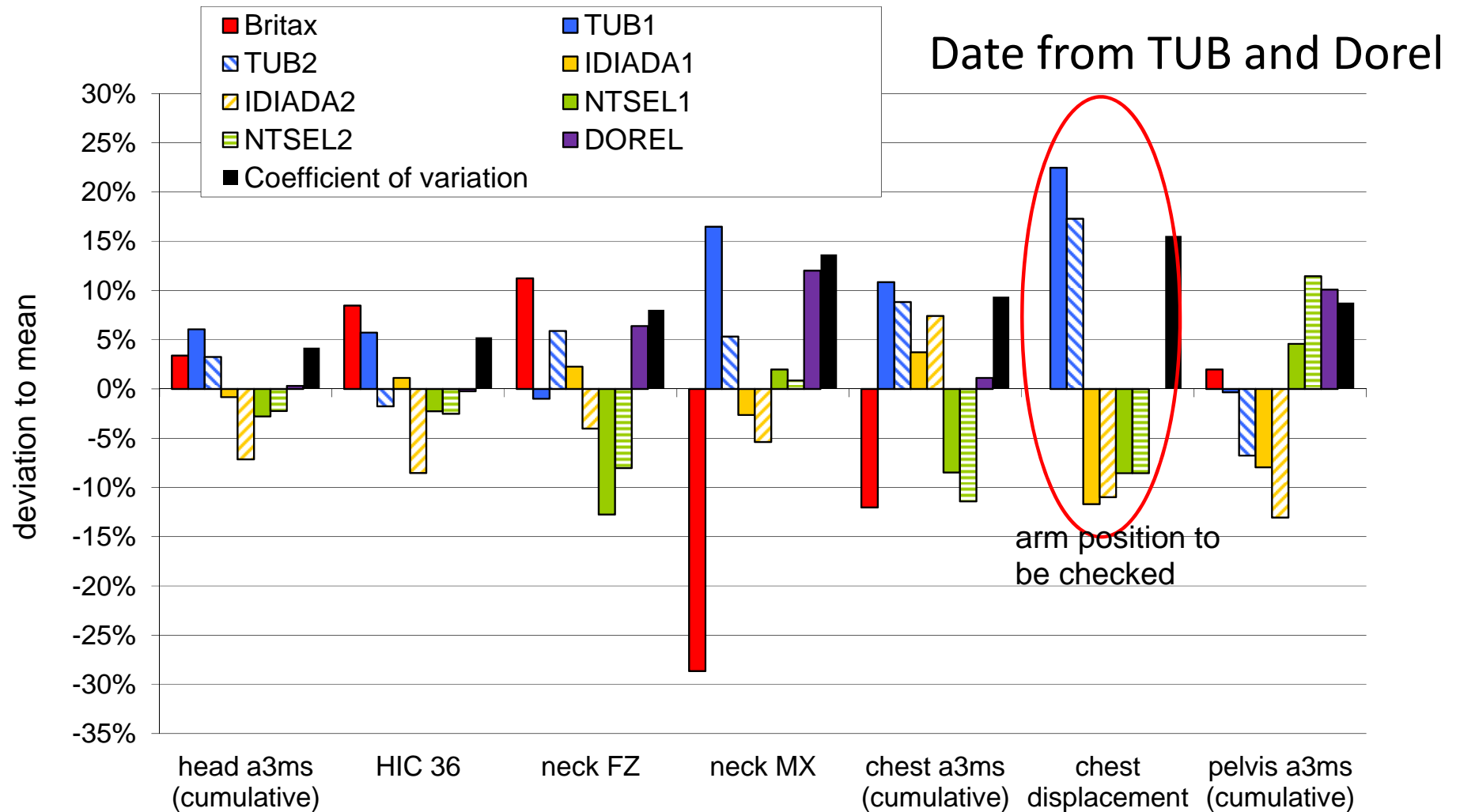
Maximum injury Measures (CRS A)

| lab | Britax | TUB | TUB | IDIADA | IDIADA | NTSEL | NTSEL | DOREL |
|-------------------------|--------|------|------|--------|--------|-------|-------|-------|
| head a3ms[g] | 68.9 | 67.0 | 69.0 | 71.9 | 76.4 | 73.3 | 72.9 | 71.1 |
| HIC 36 | 367 | 378 | 408 | 396 | 435 | 410 | 411 | 402 |
| neck FZ [N] | 733 | 834 | 777 | 807 | 859 | 931 | 892 | 773 |
| neck MX [Nm] | 23.1 | 15.0 | 17.0 | 18.4 | 18.9 | 17.6 | 17.8 | 15.8 |
| chest a3ms [g] | 55.3 | 44.0 | 45.0 | 47.5 | 45.7 | 53.5 | 55.0 | 48.8 |
| chest displacement [mm] | n/a | 15 | 16 | 22 | 21 | 21 | 21 | n/a |
| pelvis a3ms [g] | 76.2 | 78.0 | 83.0 | 83.9 | 87.9 | 74.2 | 68.8 | 69.9 |

Date from TUB and Dorel



Maximum Injury Measures (CRS A)



As for the head injury measures, the test results were almost similar



Video of Side Impact Test (CRS A)

Deceleration Sled

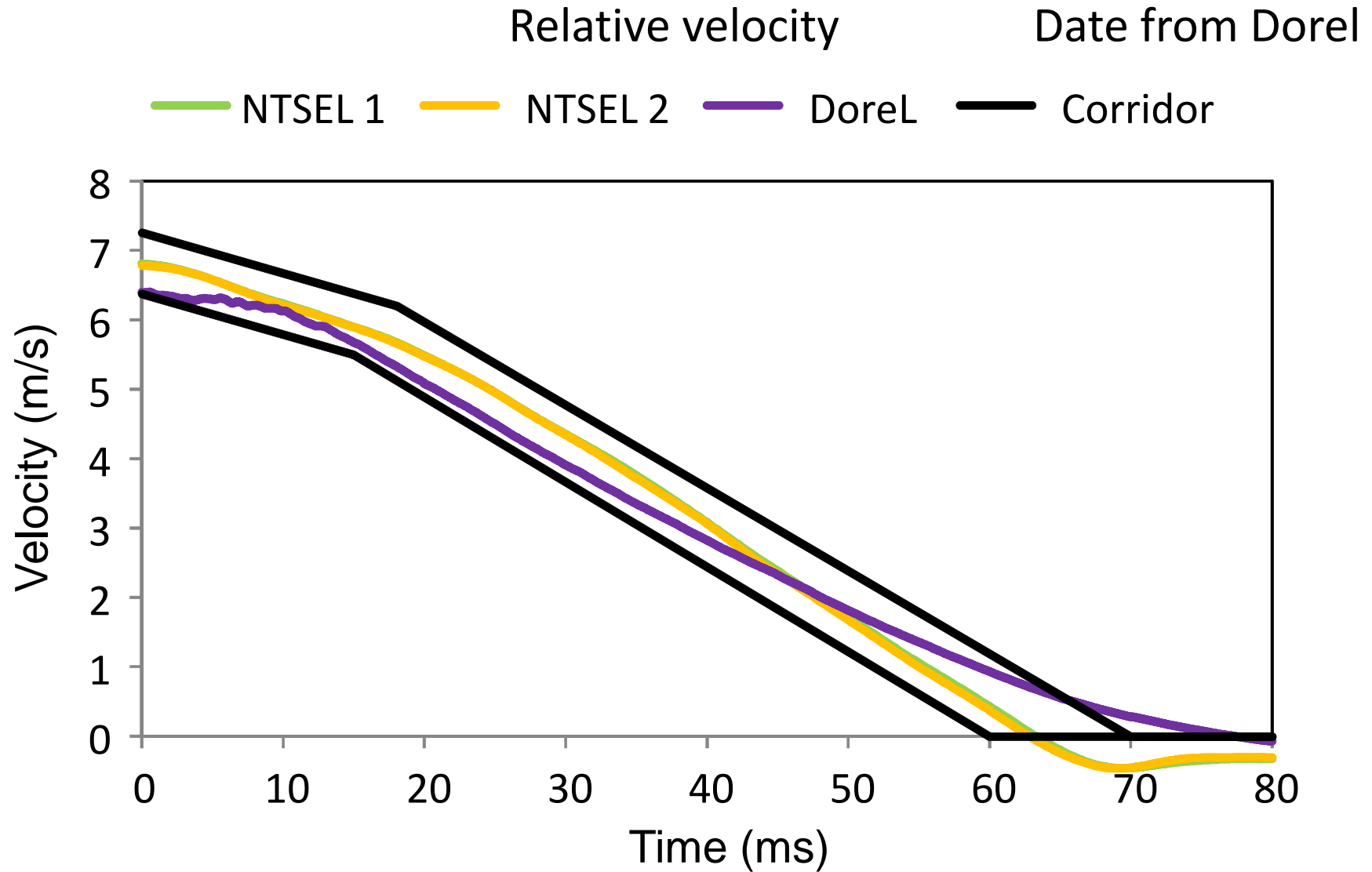


Acceleration Sled



Date from Dorel

Time Histories (CRS A)

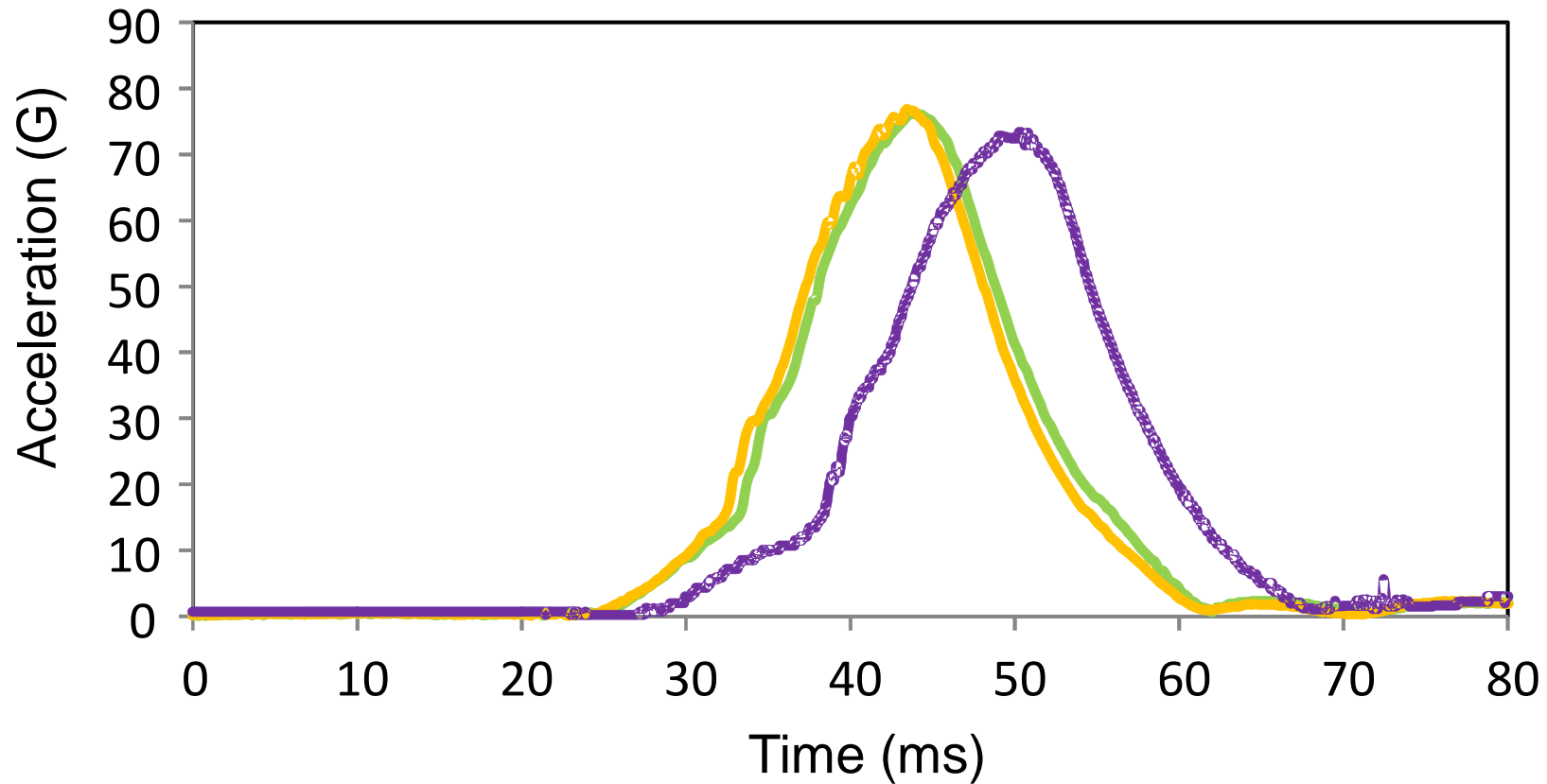


Time Histories (CRS A)

Head acceleration

Date from Dorel

— NTSEL 1 — NTSEL 2 — Doel



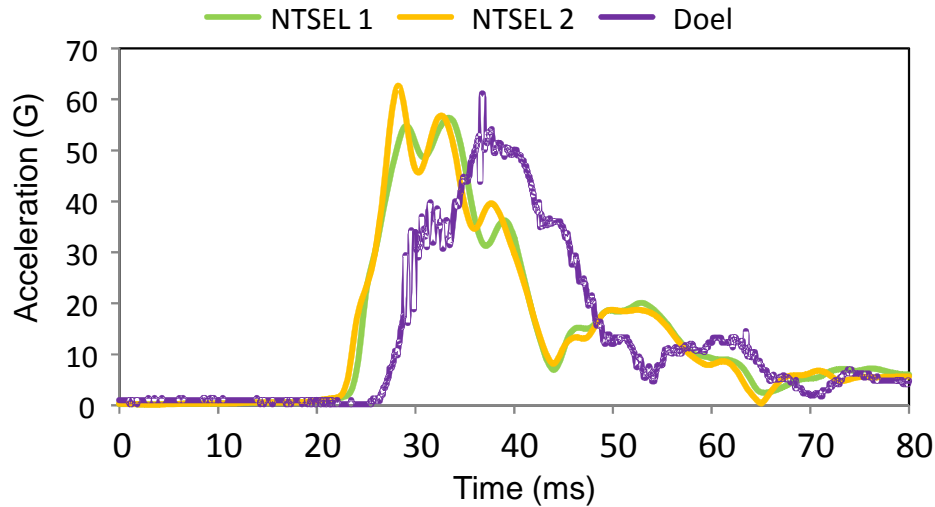
As for the head acceleration, time histories were almost similar



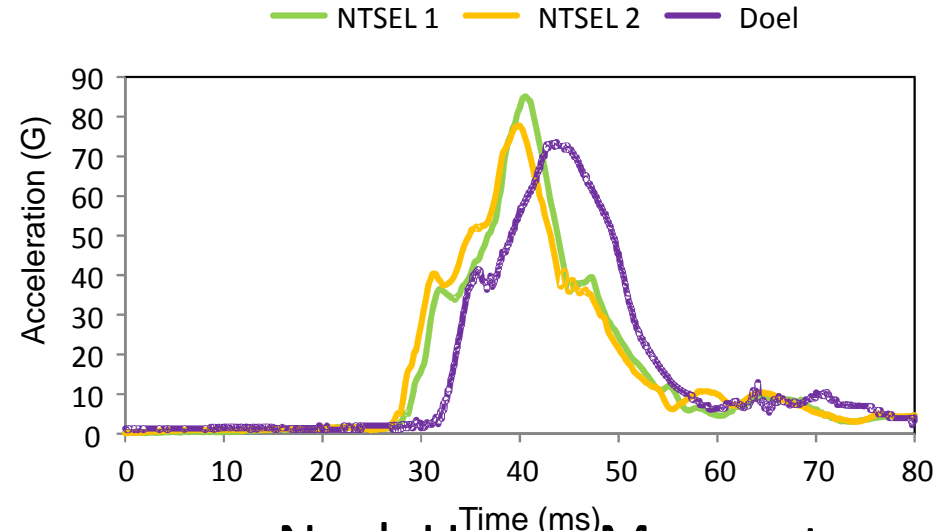
Time Histories (CRS A)

Date from Dorel

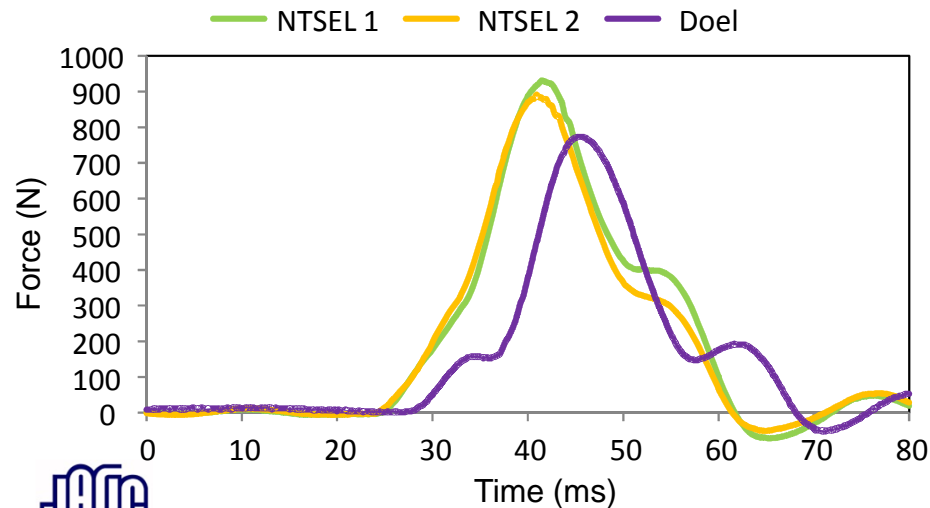
Chest acceleration



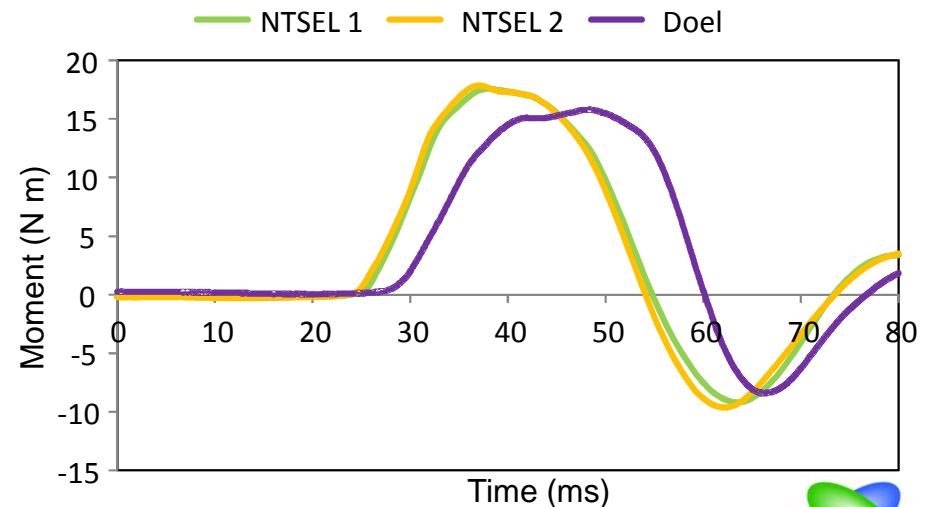
Pelvis acceleration



Neck Upper Force



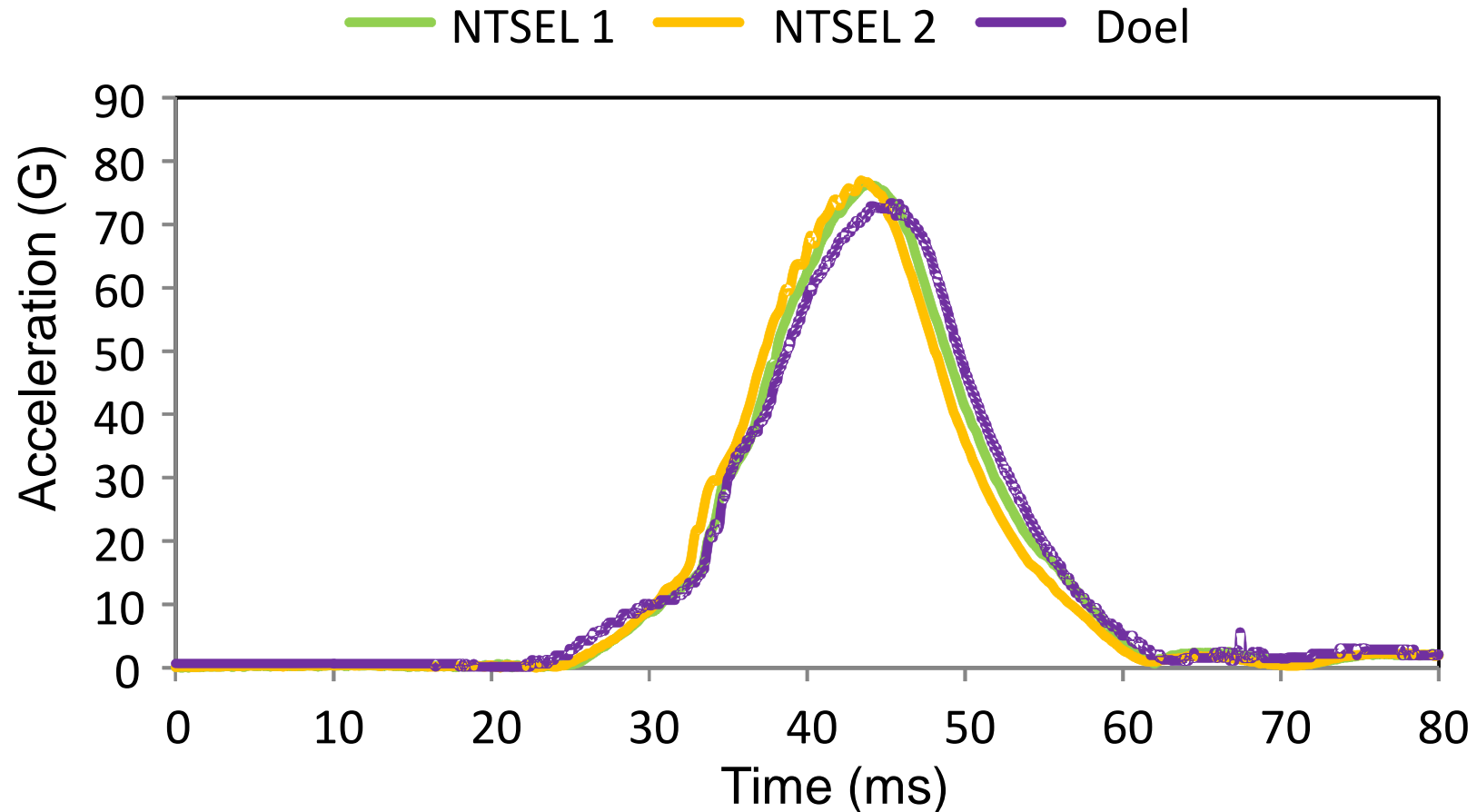
Neck Upper Moment



Time Histories (CRS A)

Date from Dorel

Head acceleration (Dorel data moves 5ms)



As for the head acceleration, time histories were almost similar

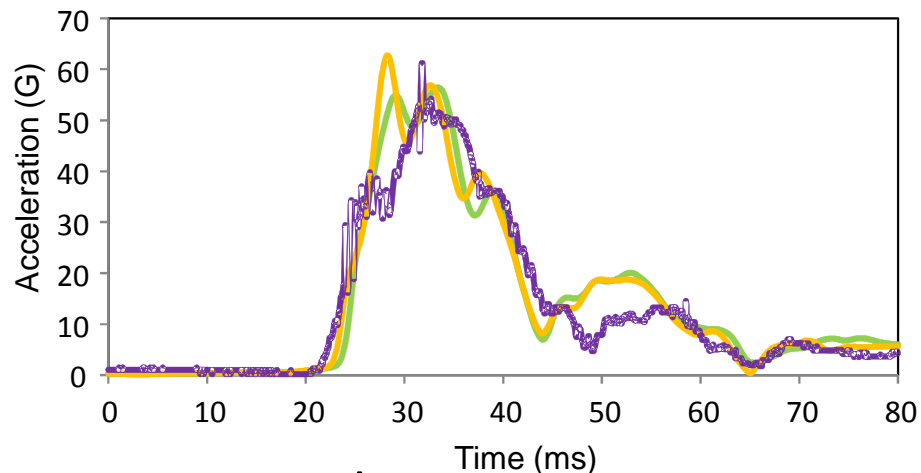
Time Histories (CRS A)

Dorel data moves 5ms

Date from Dorel

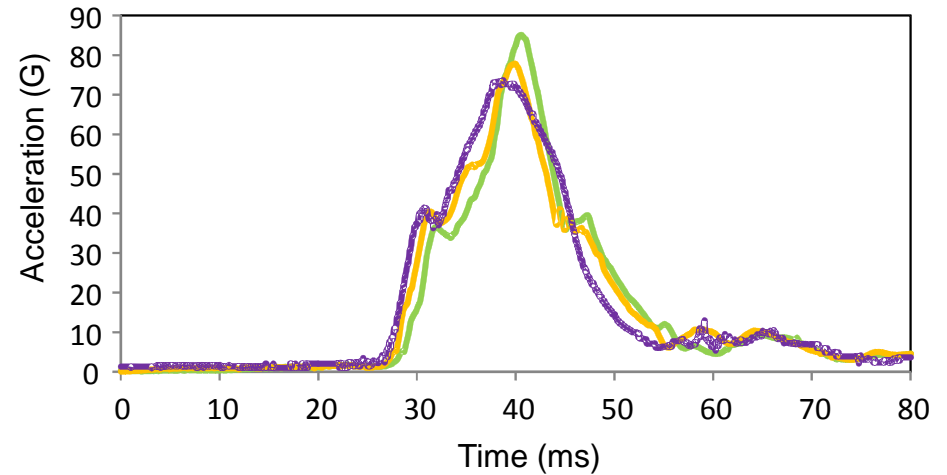
Chest acceleration

— NTSEL 1 — NTSEL 2 — Doel



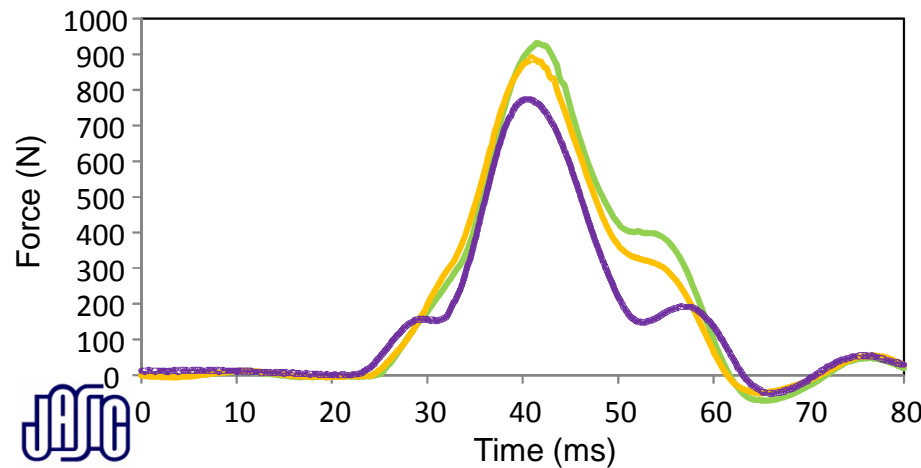
Pelvis acceleration

— NTSEL 1 — NTSEL 2 — Doel



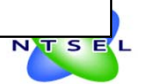
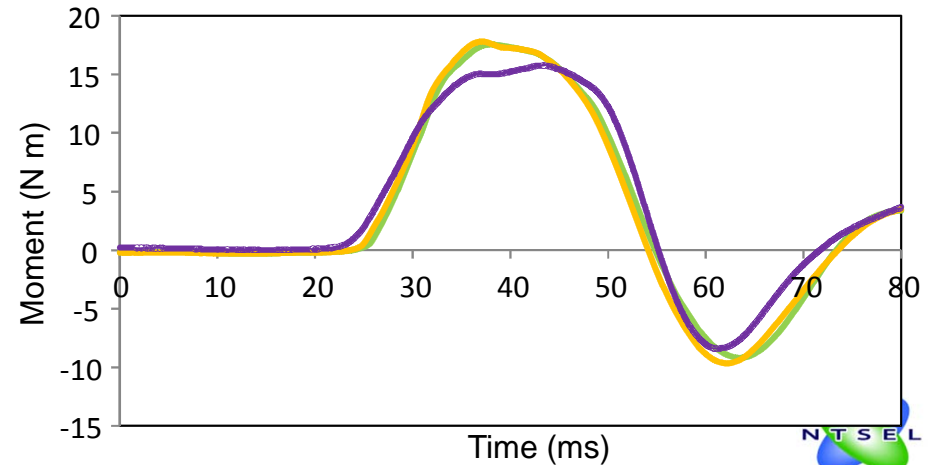
Neck Upper Force

— NTSEL 1 — NTSEL 2 — Doel



Neck Upper Moment

— NTSEL 1 — NTSEL 2 — Doel



Maximum Injury Measures (CRS B)

Date from Dorel

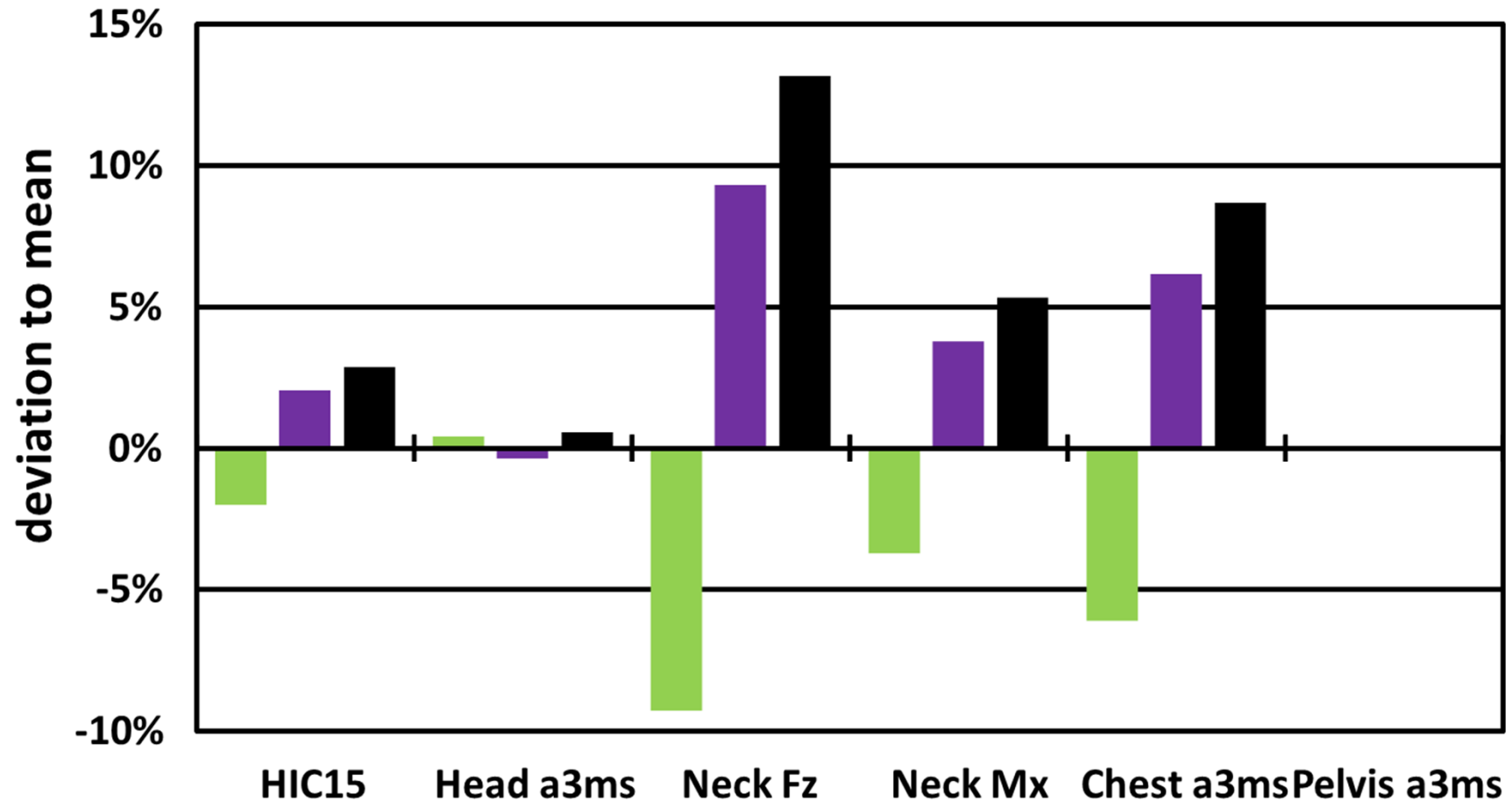
| Body region | Injury Criteria | unit | NTSEL | Dorel |
|-------------|-----------------------------------|------|-------|-------|
| Head | HIC15 | | 328 | 315 |
| | Head Maximum Acceleration (3ms) | G | 60.9 | 61.3 |
| Neck | Neck Fz | N | 886 | 735 |
| | Neck Mx | Nm | 13.8 | 12.8 |
| Thorax | Chest Deflection | mm | 20.8 | - |
| | Chest Maximum Acceleratoin (3ms) | G | 63.0 | 55.8 |
| Pelvis | Pelvis Maximum Acceleratoin (3ms) | G | 88.5 | 88.4 |

Date from Dorel



Maximum Injury Measures (CRS B)

■ NTSEL ■ Dorel ■ coefficient of variation



As for the head injury measures, the test results were almost similar



Date from Dorel



Video of Side Impact Test (CRS B)

Deceleration Sled



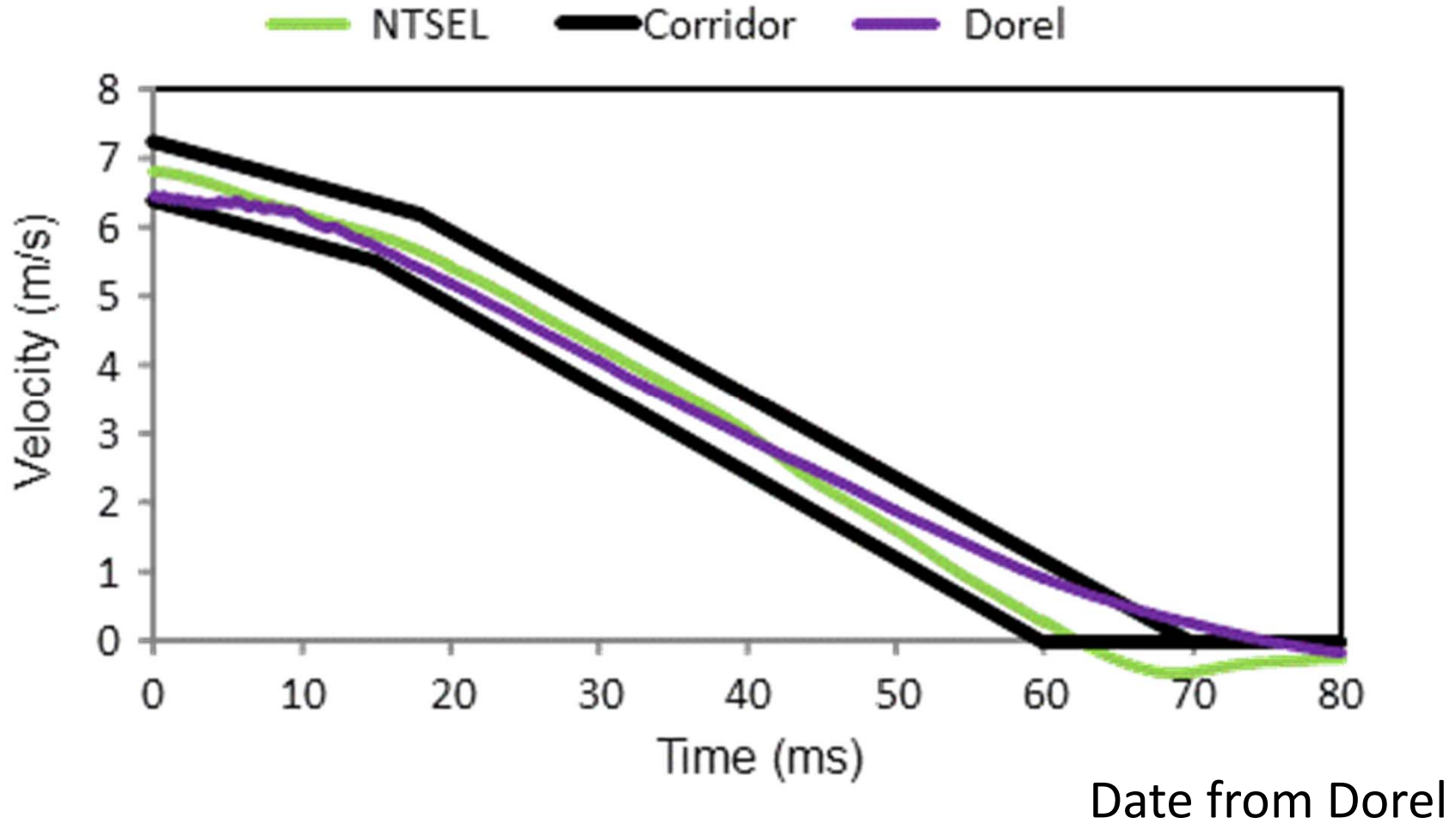
Acceleration Sled



Date from Dorel

Time Histories (CRS B)

Relative velocity

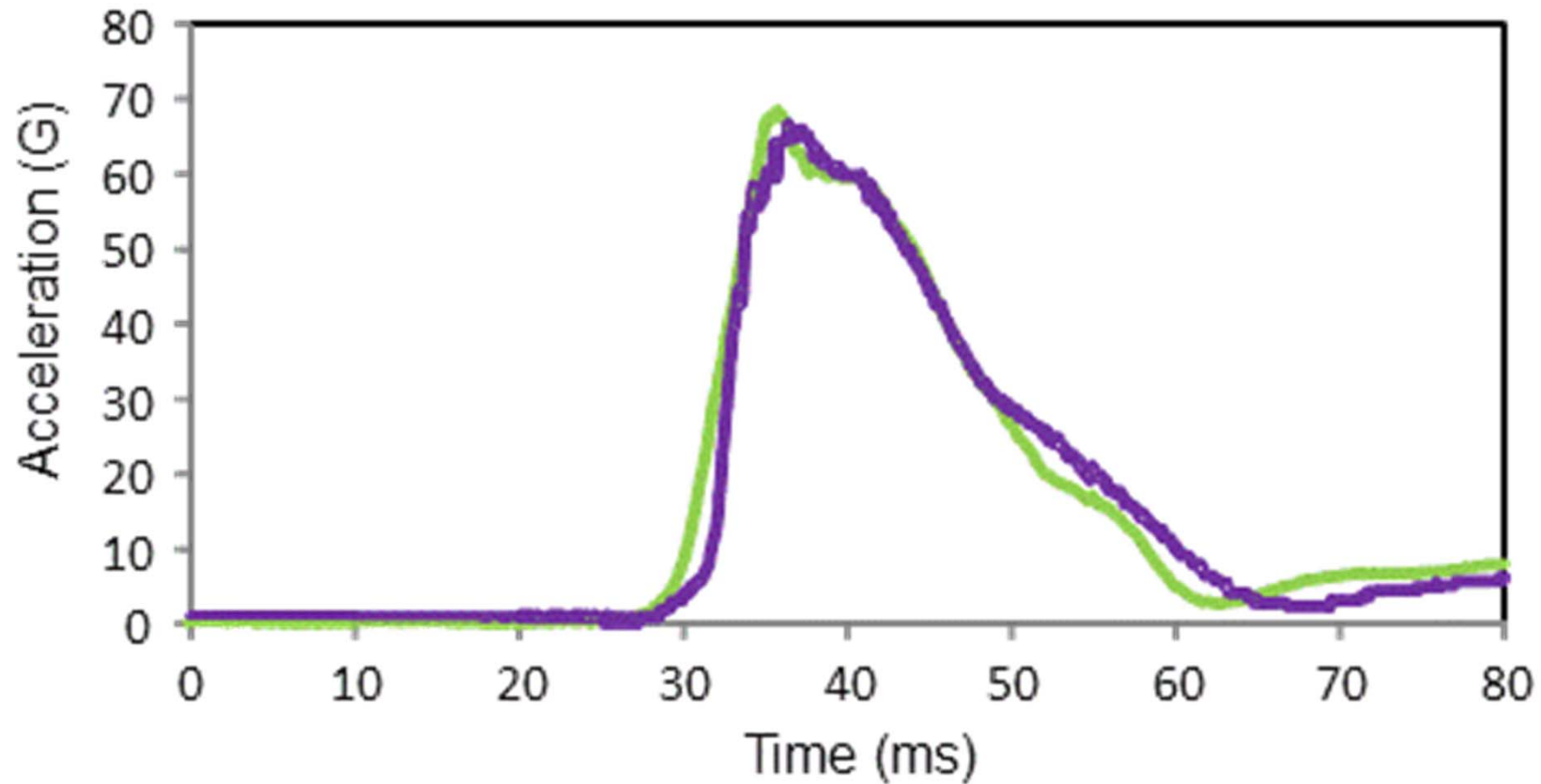


Time Histories (CRS B)

Head acceleration

— NTSEL — Dorel

Date from Dorel

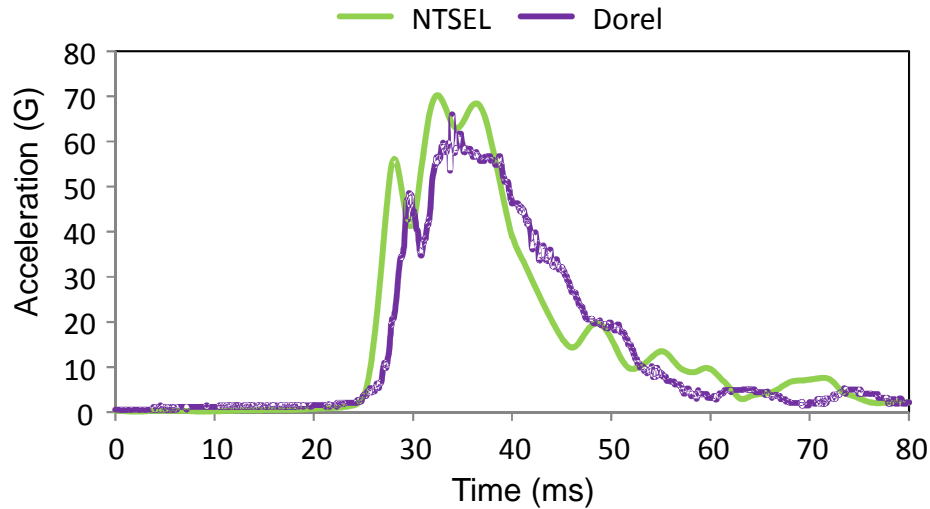


As for the head acceleration, time histories were almost similar

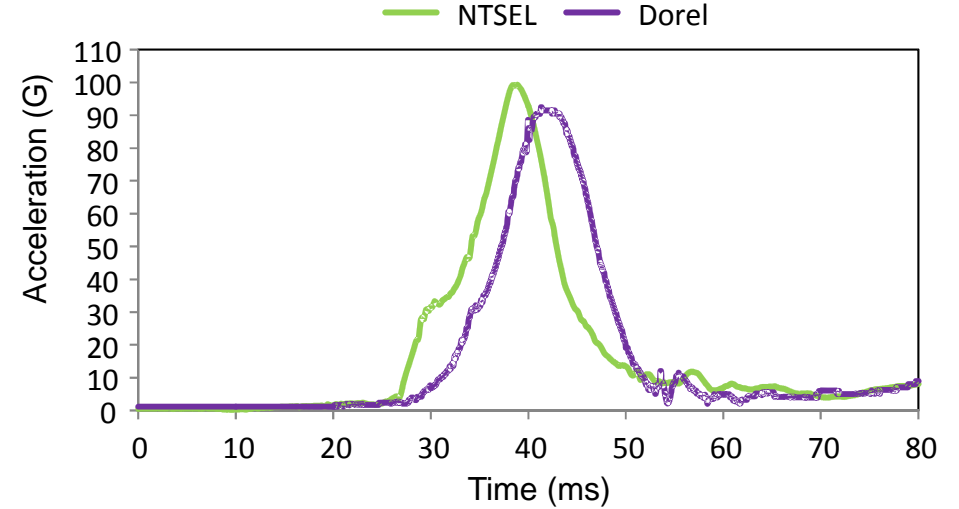


Time Histories (CRS B) Date from Dorel

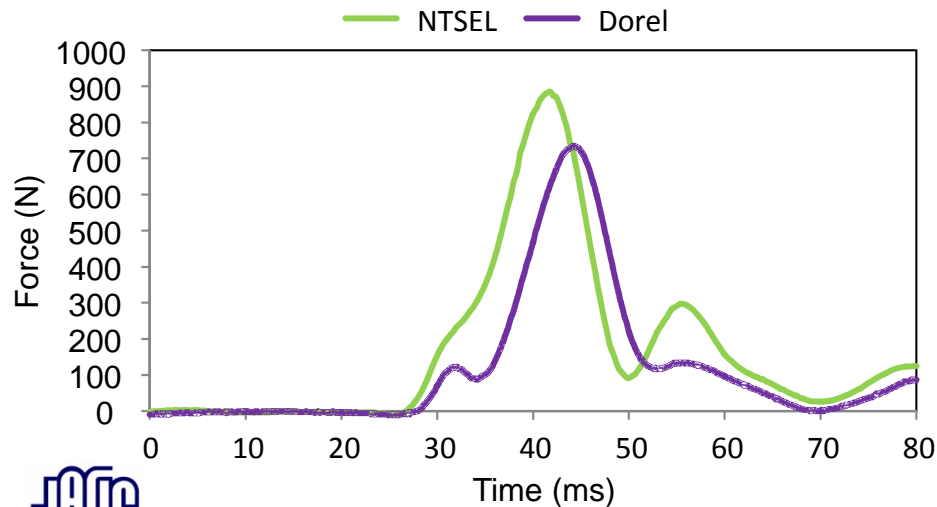
Chest acceleration



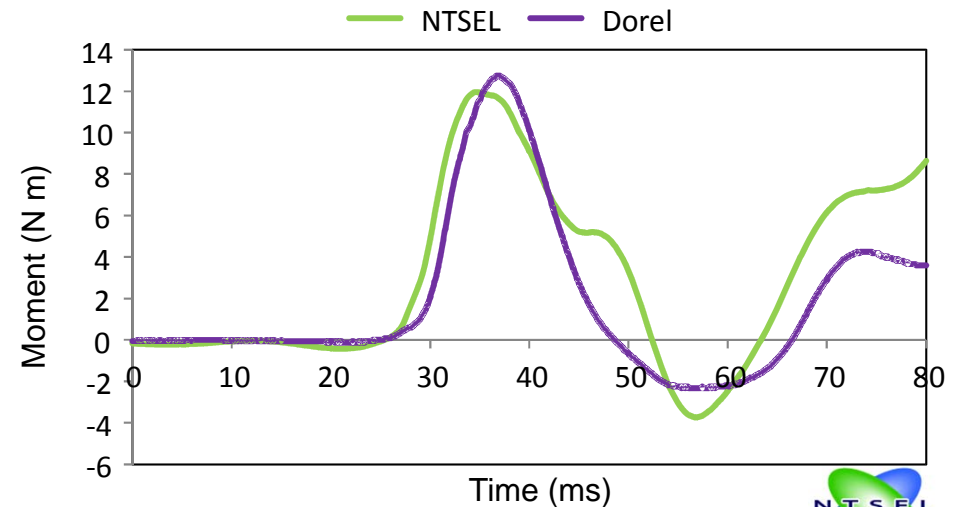
Pelvis acceleration



Neck Upper Force



Neck Upper Moment



Conclusion

- As for the head injury measures, the results used by acceleration sled and deceleration sled were almost similar.
- Comparison of Dorel data and NTSEL data, time histories were almost similar.

Severity of the CRS side impact test used by deceleration sled and acceleration sled are similar.

