



WorldSID test results

Autoliv Research

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Overview

- WSID 5% rear-seat sled tests
- WSID 5% & 50% front-seat sled test
- Hardware issues
- High speed Car-to-Car intersection crash
- UVa / Autoliv WSID-PMHS impactor tests

Rear-Seat Sled Tests

-setup

- Sled rig
 - Half body in white
 - from a compact sized car
 - Vehicle door trim, lower c-trim and rear seat
 - Lincap vehicle pulse
 - From NHTSA test
 - Dummy
 - SIDIIIs, WorldSID5%



Rear-Seat - Sled test

No Side Airbag



Rear-Seat - Sled test

Standard Thorax/Pelvis Side Airbag

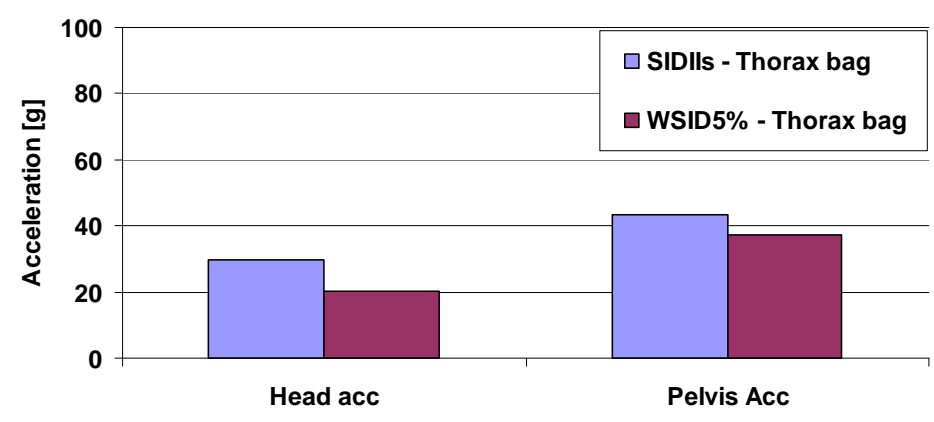
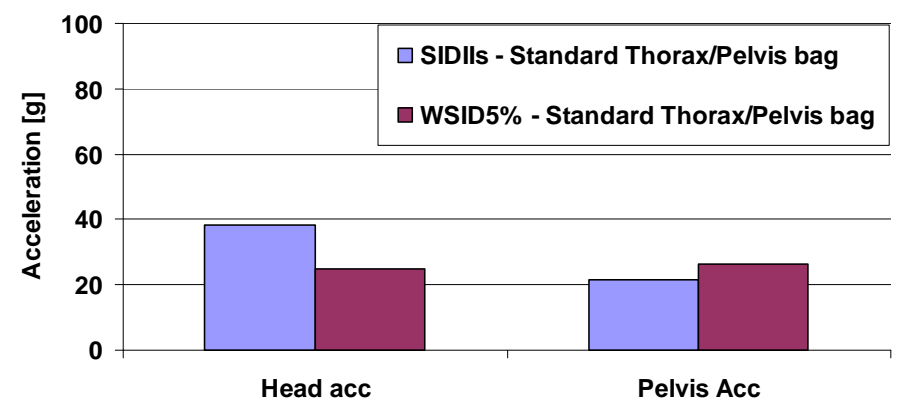
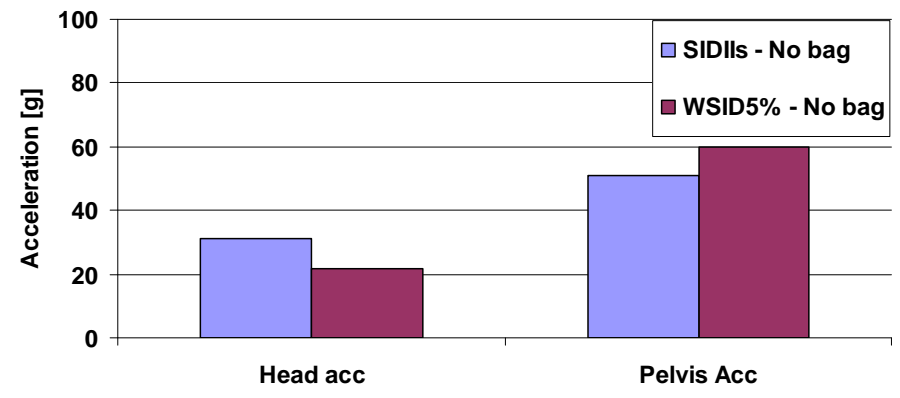


Rear-Seat - Sled test

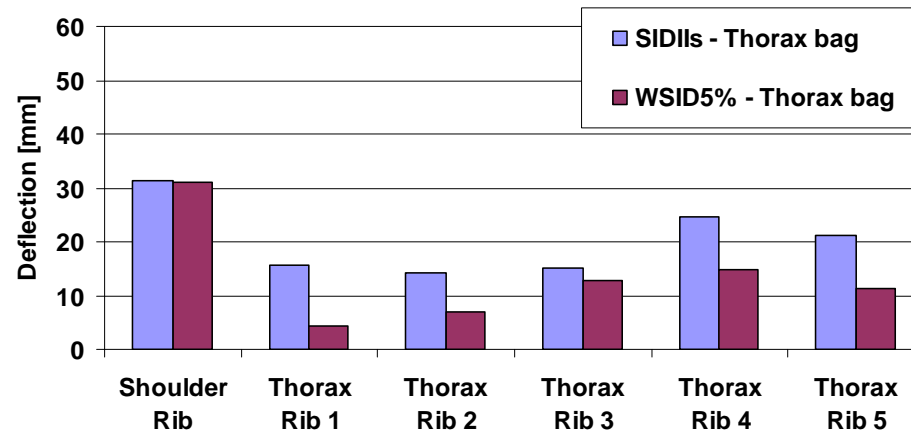
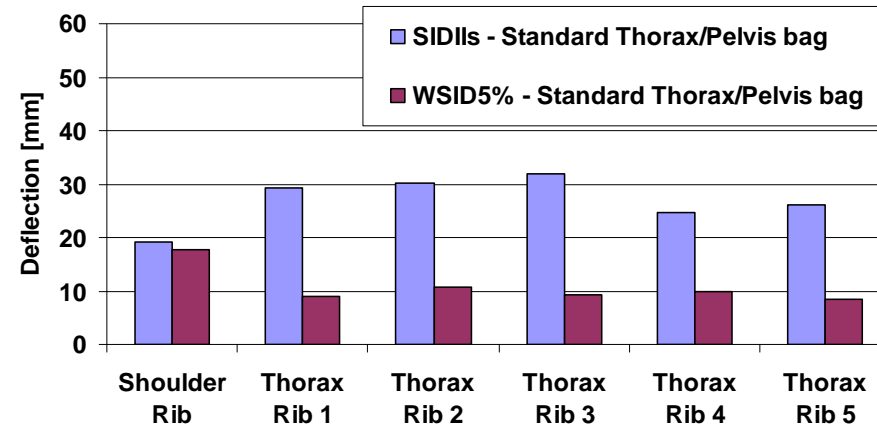
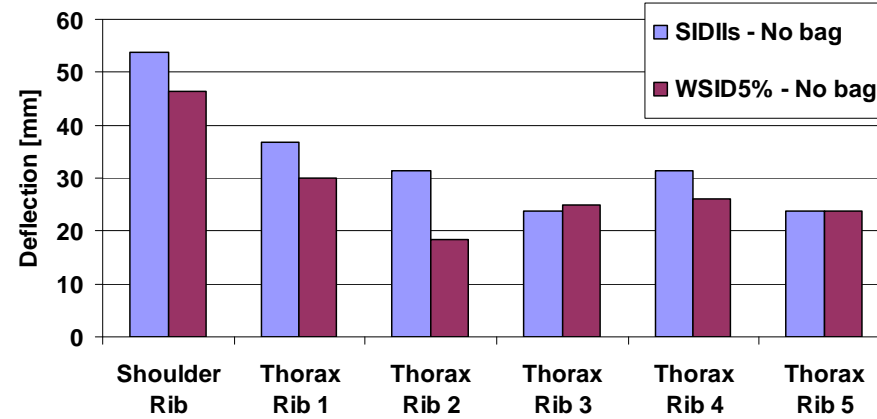
Thorax Side Airbag



Rear-Seat - Sled test



Rear-Seat - Sled test



Conclusions

- Different kinematic behavior for WSID 5% compared to SIDIIs
- Difference in deflection measurement for WSID 5% vs SIDIIs
- Need of reliable and acceptable risk functions
 - Dummy comparison
 - Front- and rear seat comparison
- More measurements in pelvis

Front-Seat Sled Tests

-setup

- Sled rig
 - Intruding door side
 - Generic padding as door panel
 - Front seat
- Generic EuroNCAP pulse
- Dummy
 - WorldSID 50%, WorldSID 5%

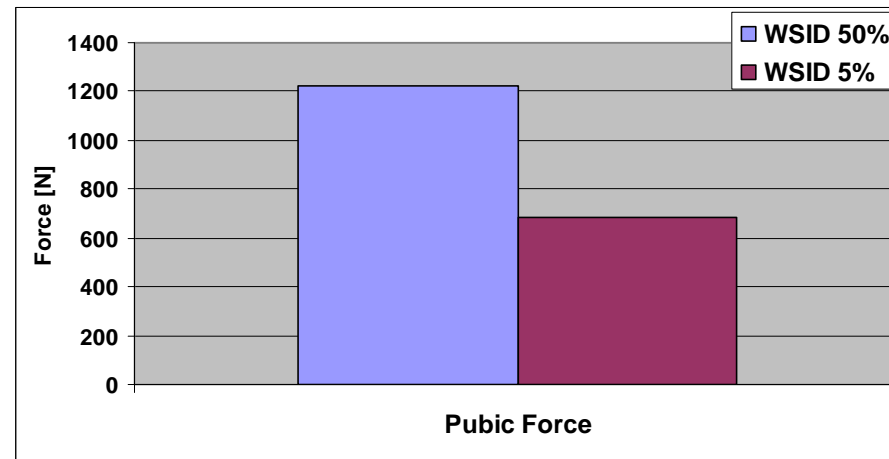
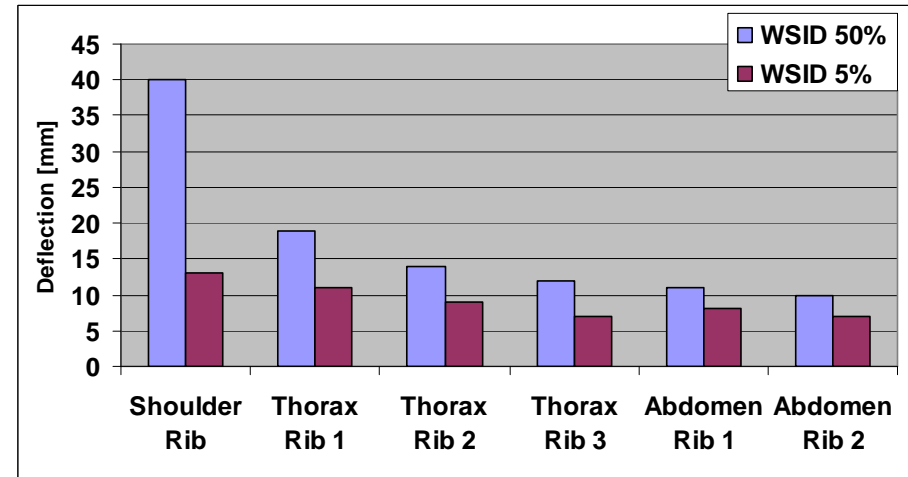
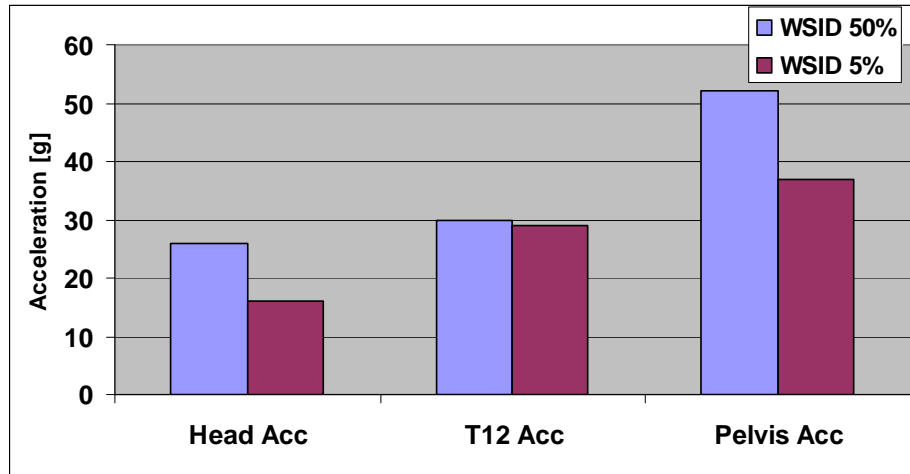


Front-Seat - Sled test

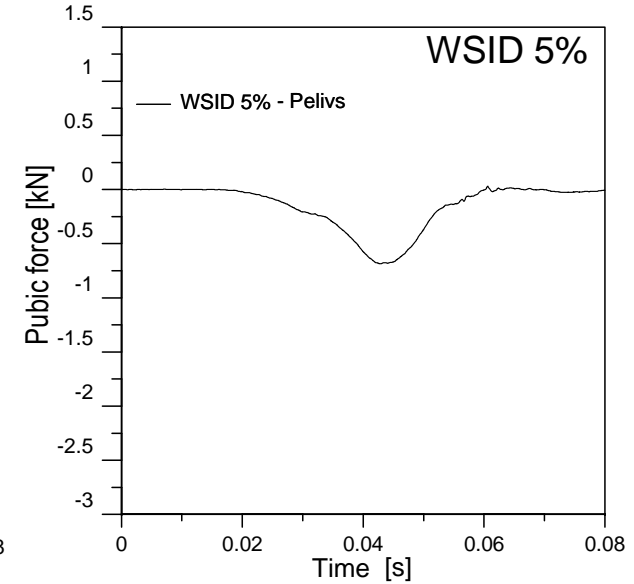
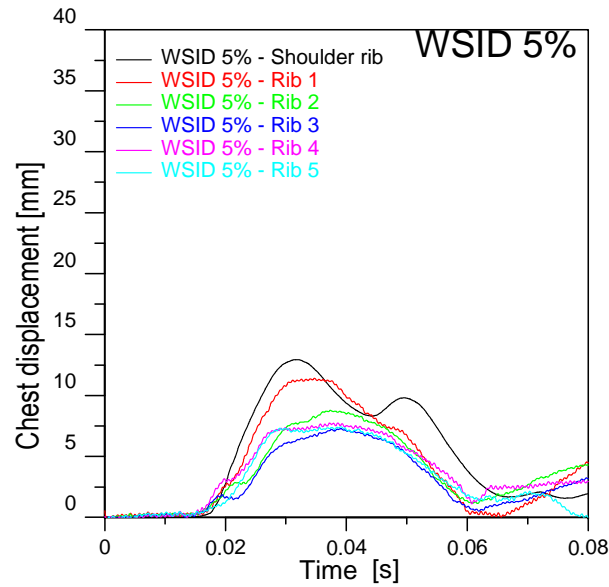
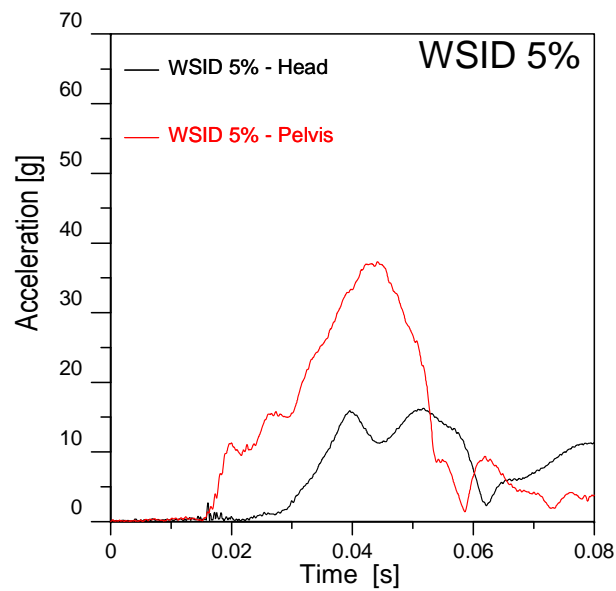
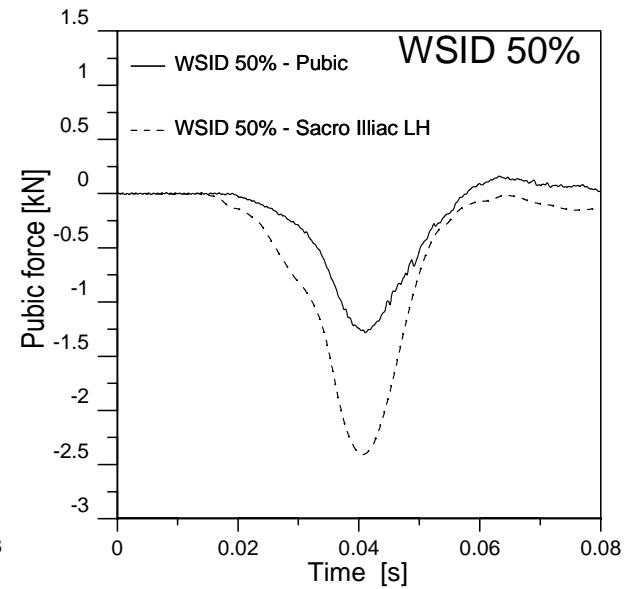
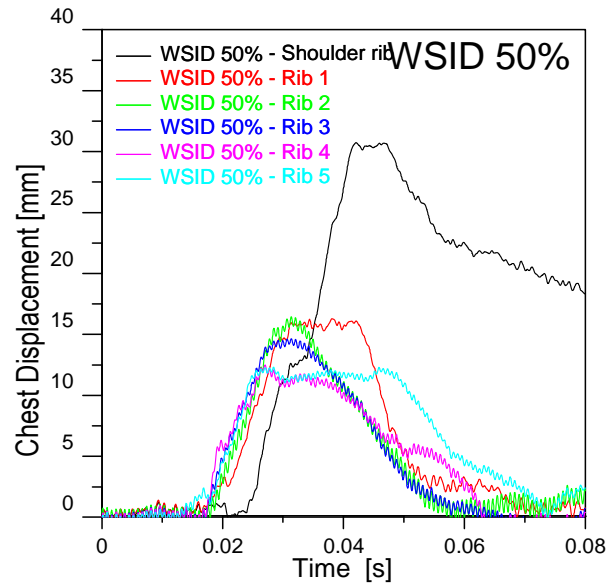
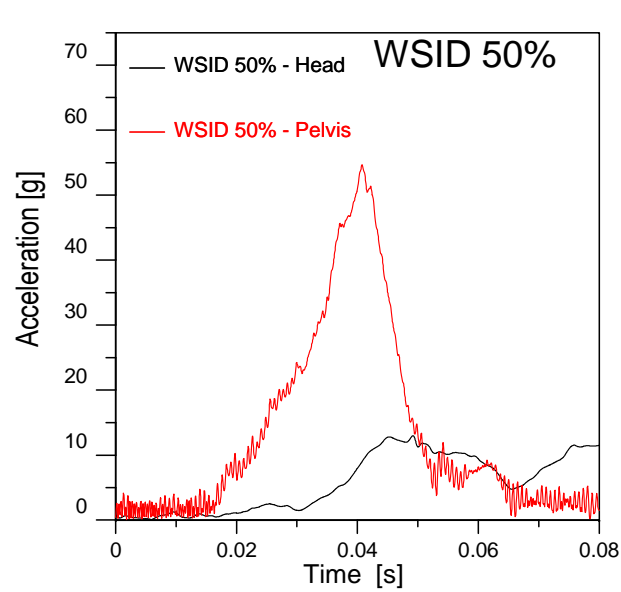
EuroNCAP generic pulse-
Thorax Side Airbag



Dummy measurements – WSID 50% & 5%



Front-Seat Sled Test – WSID 50 & 5%-ile



Hardware issues

- WSID 5&50% Pelvis measurement lost in many tests
 - Pubic load cell
 - Sacro Iliac load cell



- Neck torn on WSID 5%

- WSID 50% Range of motion for Shoulder IR-TRACC
 - Broken in 214 Pole test



Improved side impact protection in the traffic of the future – car to car full vehicle crashes with WorldSID 50%



CHALMERS



**Karolinska
Institutet**



Full-scale tests

Bullet & Target:

Impact speed:

Purpose:

2009

Mid size vs. Mid size

55 km/h

Mid size vs. Mid size

70 km/h

Mid size vs. Mid size

80 km/h

Influence of Impact speed

Mid size vs. Small car

55 km/h

Influence of mass ratio

2010

Older vs. Older

55 km/h

Relation to real life data

Older vs. Older

70 km/h

Plattform SUV vs. Mid size

65 km/h

Frame SUV vs. Mid size

65 km/h

Influence of mass and compatibility

AE-MDB vs. Mid size

60 km/h

Potential future load case

Mid size versus Mid size

70 km/h / 30 km/h

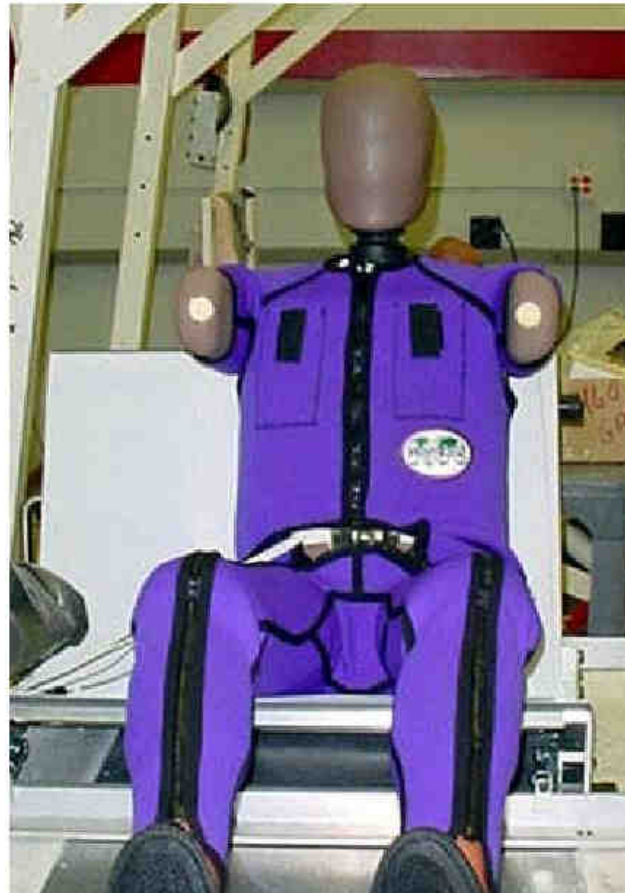
Representative intersection crash

Intersection crash



Intersection crash

- AIS3+ Injury risks (Petitjean et. al 2009, survival method)



Shoulder 1.5 %

Thorax /
Abdomen 1.0 %

Pelvis 24.0 %

Project Highlights

- WorldSID improved tool for side impact evaluation
- Good structural integrity of all target vehicles
- SAB presence reduce the occupant thoracic injury risk
- Thorax Injury Risks < 10% for a 45 year old occupant

Additionally...

Future focus for side impact protection

1. Pelvis loading
2. Occupant-to-Occupant Interaction
3. Rear-Seat
4. Senior occupants



WorldSID related Conclusions

WorldSID – good tool for evaluating overall side impact occupant protection.

- Spine kinematic
- Bi-lateral loading
- Ability to measure low and high crash severities
- Different response from different side airbag concepts

Specific points of interest:

- Rib rotation
- Shoulder kinematics
- Pelvis measurement and injury risk