Side Pole Impact

Accidents and Vehicle Testing

SidePole Impact

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Accident Analysis
German In-Depth Accident Study (07/2010)

The Accident Data presented during the 1st Meeting left some questions unanswered.

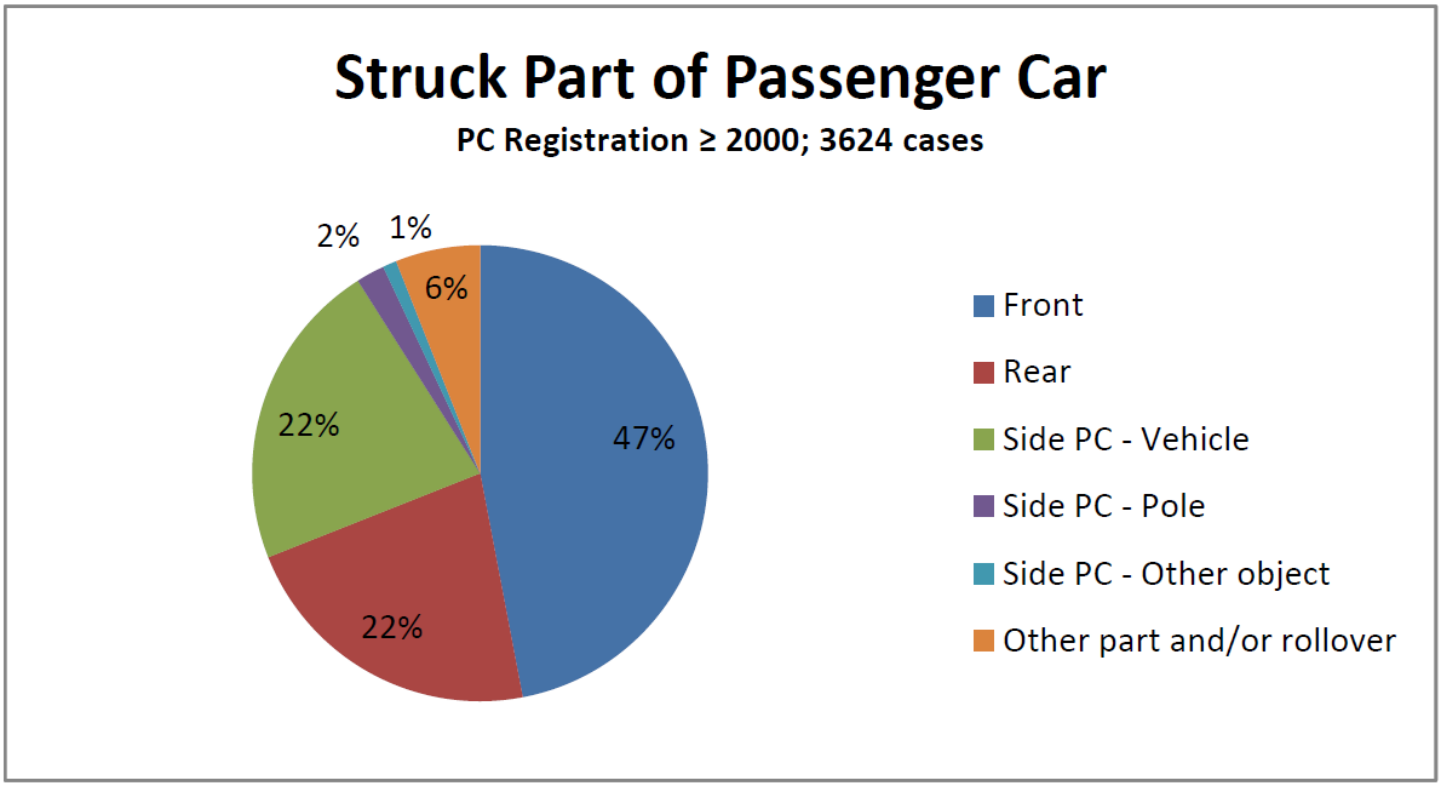
New Study was performed using the detailed German GIDAS-Database as of July 2010 (latest available Version).

The Study was limited to Passenger Vehicles with a date of first Registration not before 2000 to exclude outdated vehicles with regard to e.g. vehicle structure, anti-lock brakes and vehicles without any side protection restraints.
(Compared to e.g. the EEVC Study this limits the total number of all accidents from 10.644 to 3.624 or to only 34%).

For the further investigation the pole impacts were restricted to cases with impacts in the area of the Passenger Compartment to ensure correlation with a possible future Pole Impact GTR.

Accident Analysis

Impact configuration and Speed (GIDAS)

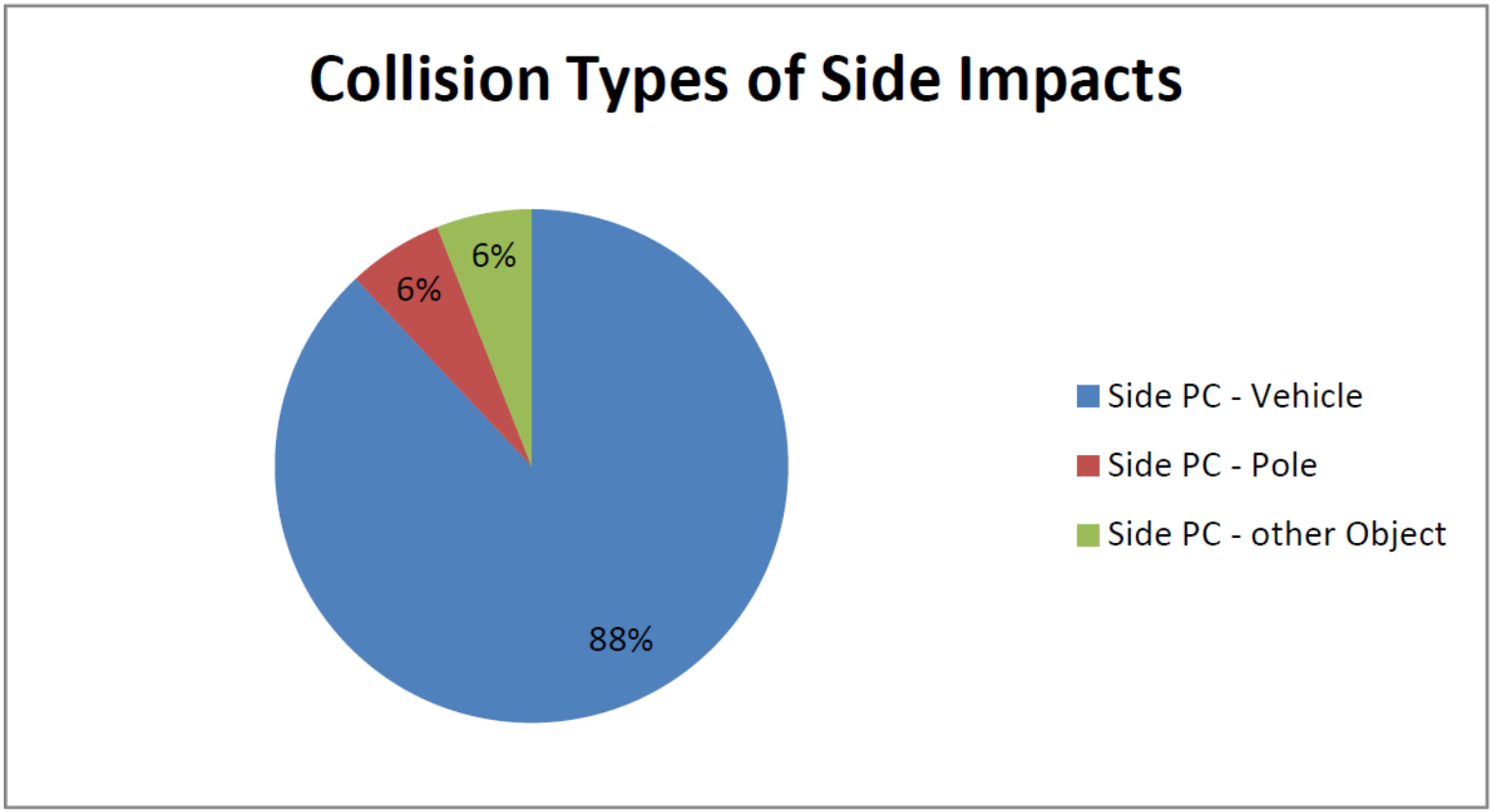


-Limitation to Passenger vehicles with first registration ≥ 2000 (Modern cars) results in 3624 cases

-The total share of Pole impacts is relatively low (approx. 2%)

Accident Analysis

Impact configuration and Speed

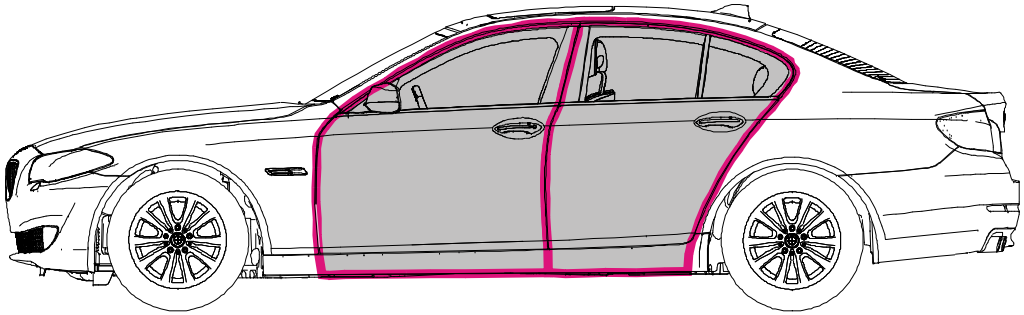


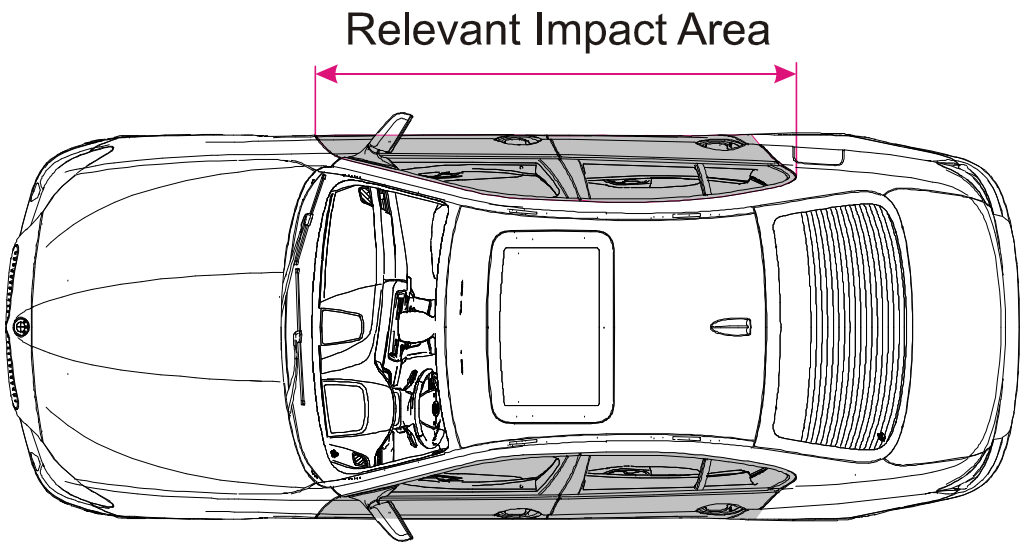
-Sample narrowed down to side Impact collisions only (897 cases)

-Pole type collisions are 6.1% of all side impacts (total: 55 cases)

Accident Analysis

Impact configuration and Speed





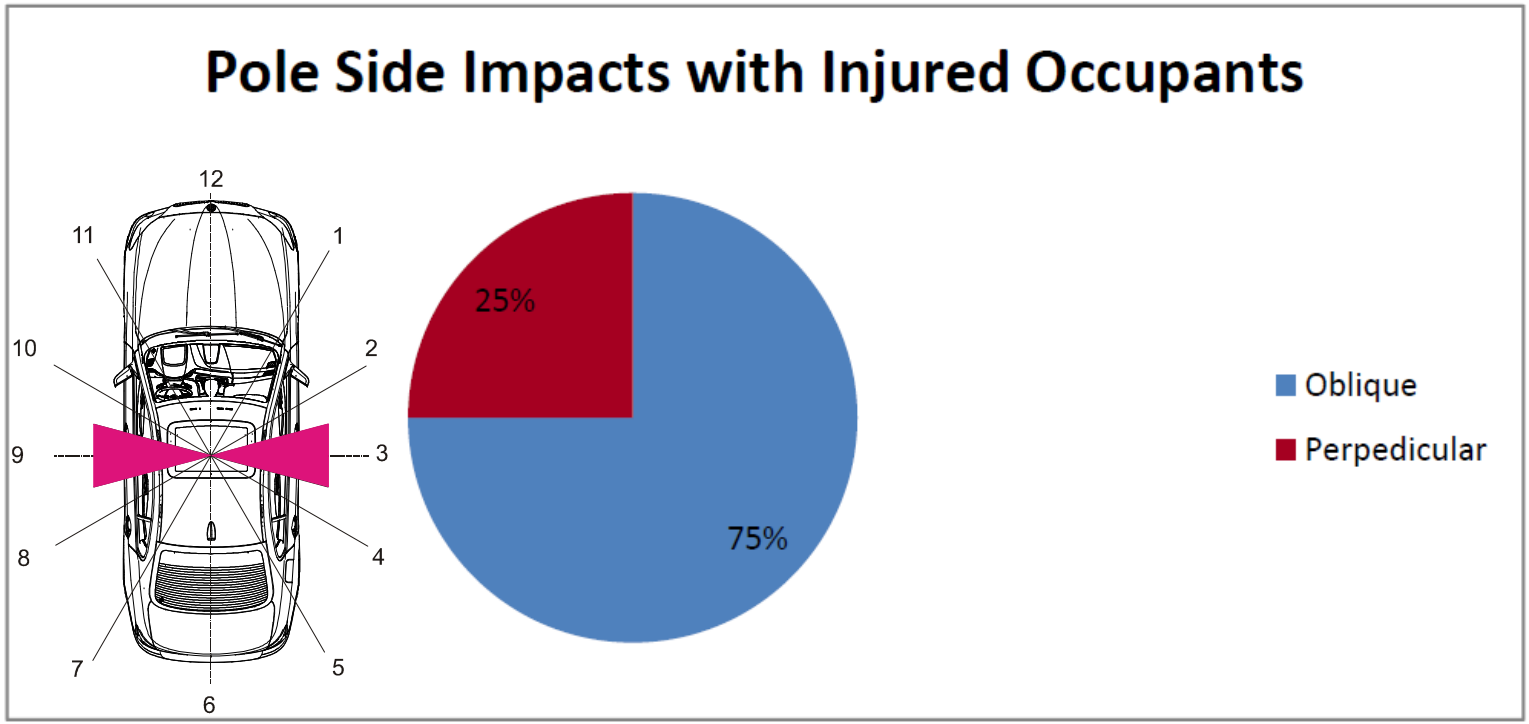
Of the 55 Pole Side Impacts only 8 cases showed an impact in the passenger compartment with an occupant present.

The Resulting assessment regarding the impact configuration and injury assessment is therefore of limited statistical significance.

However including older vehicles will give a wrong impression regarding impact angle, speed and occupant loads.

Accident Analysis

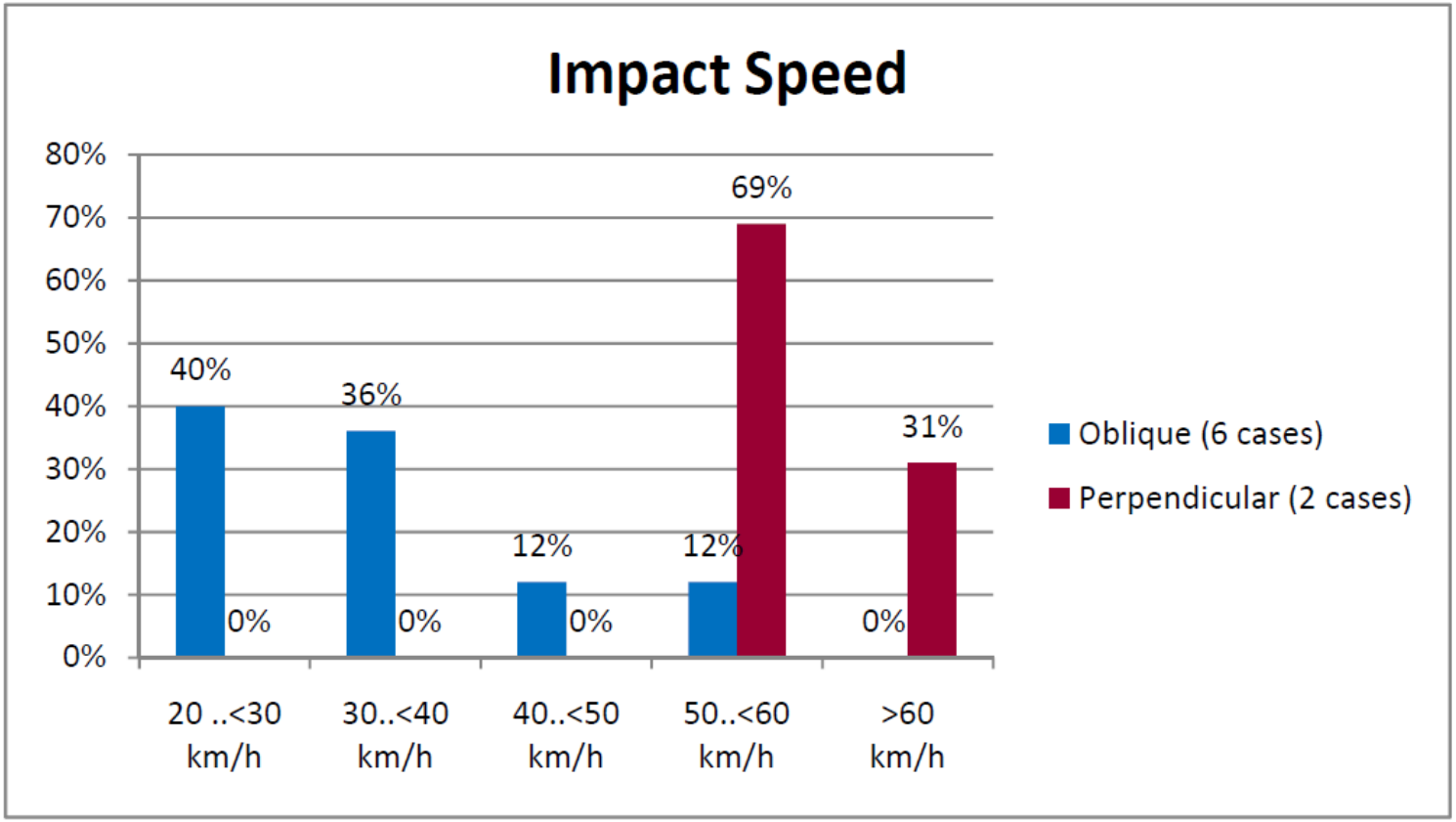
Impact configuration and Speed



-Actually 75% of Pole Side Impacts with injured occupants occur under oblique impact directions.
-Even the ones categorized as being perpendicular include a uncertainty of ± 15° around perpendicular centerline .
-There is not enough evidence to confirm the thesis that perpendicular impacts would be the most dominant ones.

Accident Analysis

Impact configuration and Speed



-The over all sample size is small

-The impact speed of the perpendicular side impacts in the sample were significantly higher than for the oblique cases.
→ More severe injuries are to be expected for perpendicular cases

Accident Analysis

Impact configuration and Speed - Conclusions

Conclusions regarding the Accident Study:

-Pole Impacts are rather rare events

-Therefore the low number of cases limits their statistic reliability.

-Nevertheless old vehicles must be excluded due to their outdated structure, stability (lack of e.g. Anti-lock brakes) and restraints (e.g. Airbags).

-The majority of Pole impacts occur under some kind of oblique condition

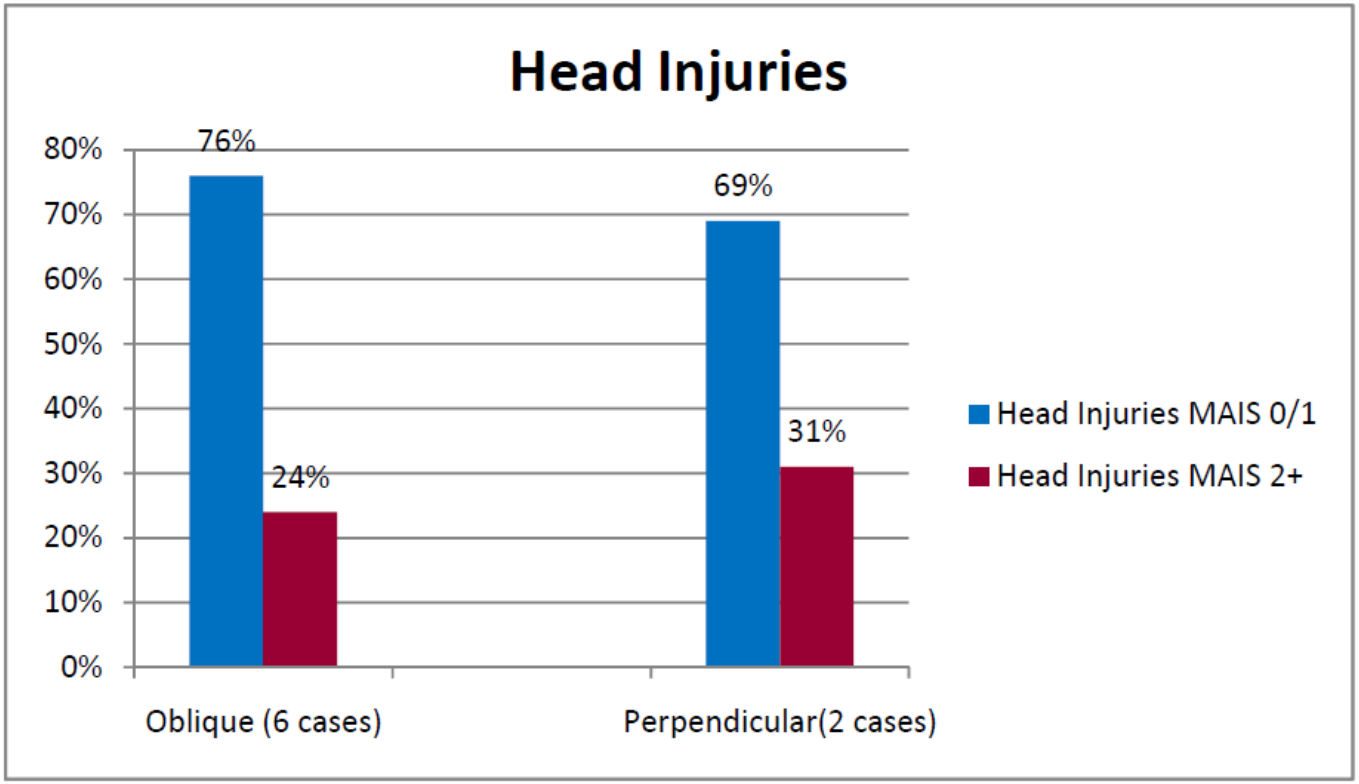
-Even Pole Impacts categorized in the databases as being perpendicular may actually have been oblique (uncertainty of ±15° arou nd the 90° direction; a 75° impact would therefore still fall in the perpendicular group).

-The accident severity (impact speed) is unevenly distributed with one of the 2 perpendicular cases being catastrophic. Due to the small sample size and severity an overemphasis of the perpendicular cases is evident.

-The former Studies did not disclose if or how such limitations were taken into account.

Accident Analysis

Occupant Injuries

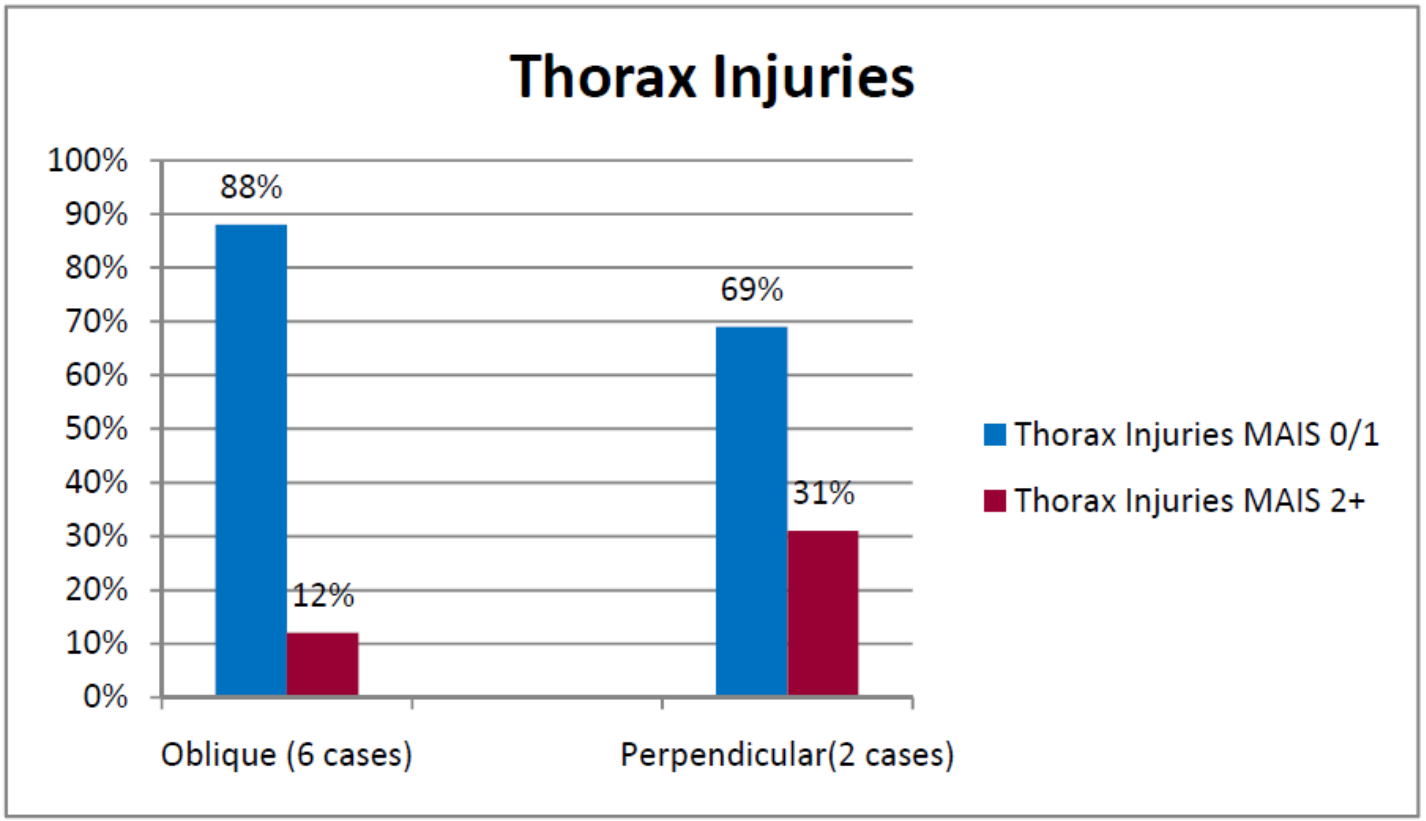


-The head injuries suffered are almost identical for perpendicular and oblique impacts.

-Taking into account that the impact speeds were significantly lower oblique cases may be considered more severe with regard to head injuries.

Accident Analysis

Occupant Injuries

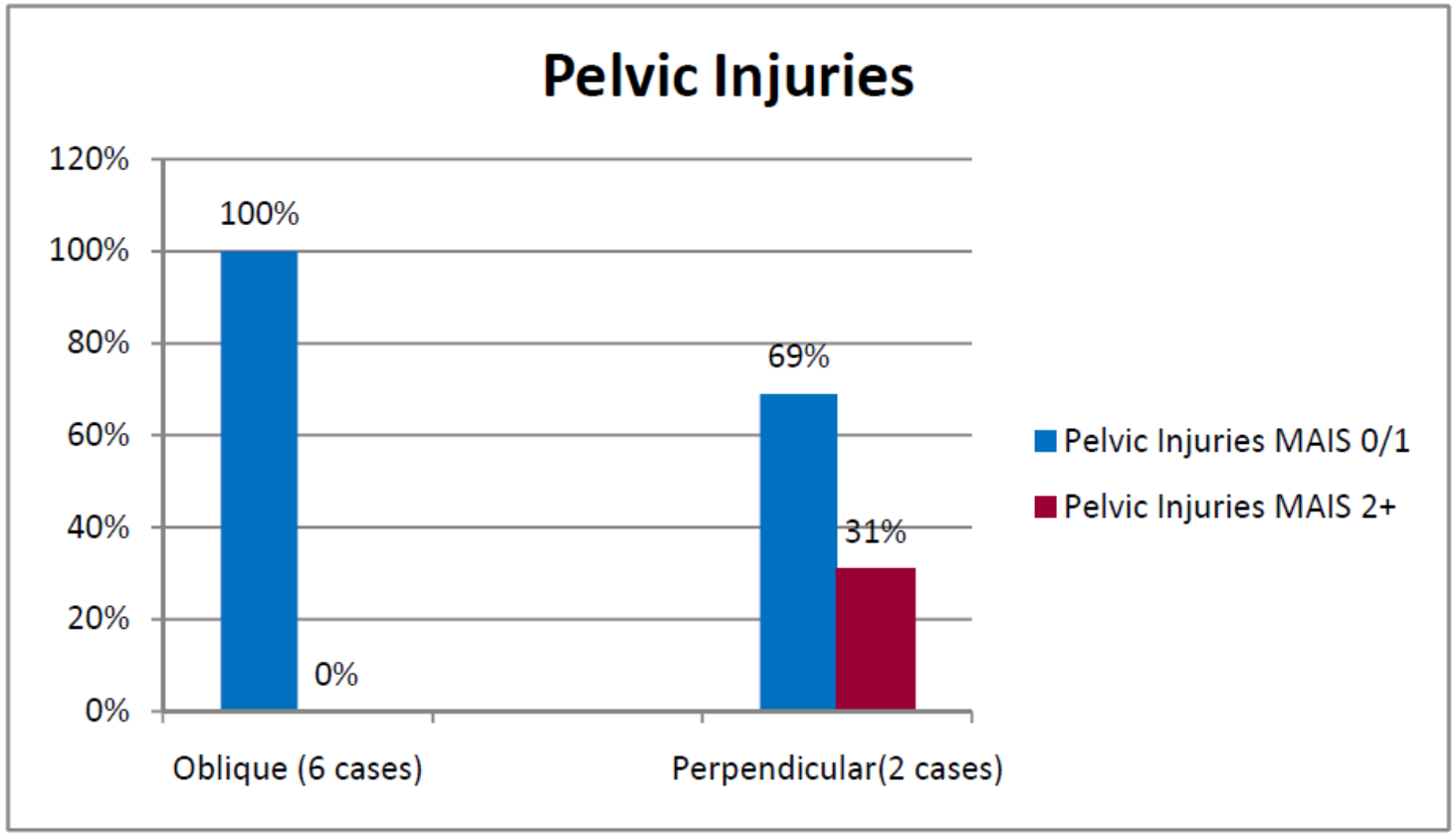


-Severe Thoracic injuries appear to be more severe in perpendicular conditions at first glance.

-However this must be put in perspective as the impact speeds were significantly higher for the perpendicular cases, with the MAIS2+ one being catastrophic.

Accident Analysis

Occupant Injuries



-The impact speed of the perpendicular side impacts in the sample was significantly higher than for the oblique cases.

-The severe ones were observed in an overly severe case (> 60 km/h)

Accident Analysis

Effect of Electronic Stability Control (ESC)

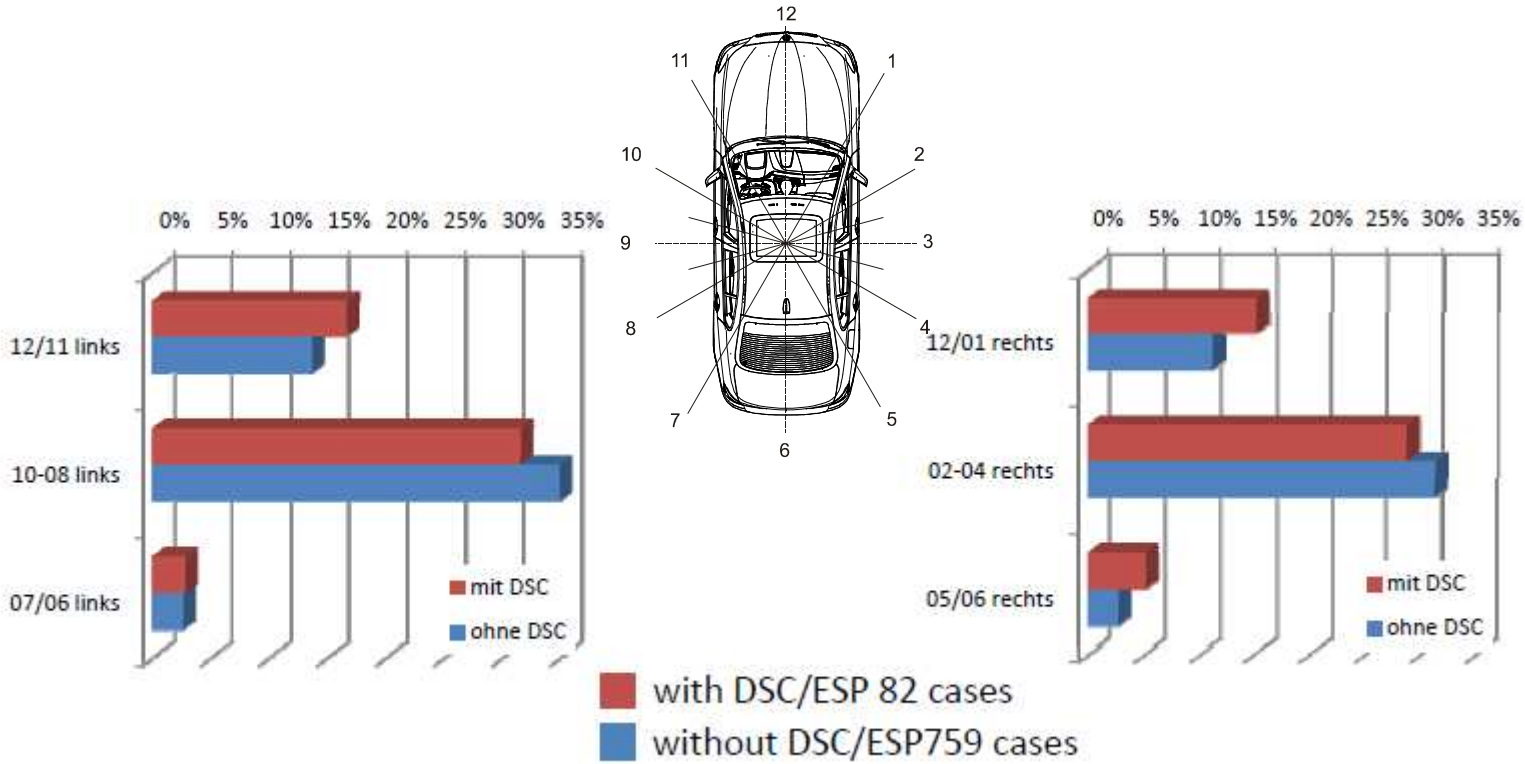
The fitting of Electronic Stability Control systems as series equipment is already implemented in legislation, and is about to be phased in.

While it is agreed that ESC will significantly reduce Pole Type Side Impacts it is a valid point to ask if ESC will have any effect on the impact direction.

To answer this Pole Type Impact in GIDAS were assessed specifically with regard to the presence of ESC systems and impact direction.

Accident Analysis - GIDAS

Effect of Electronic Stability Control (ESC)

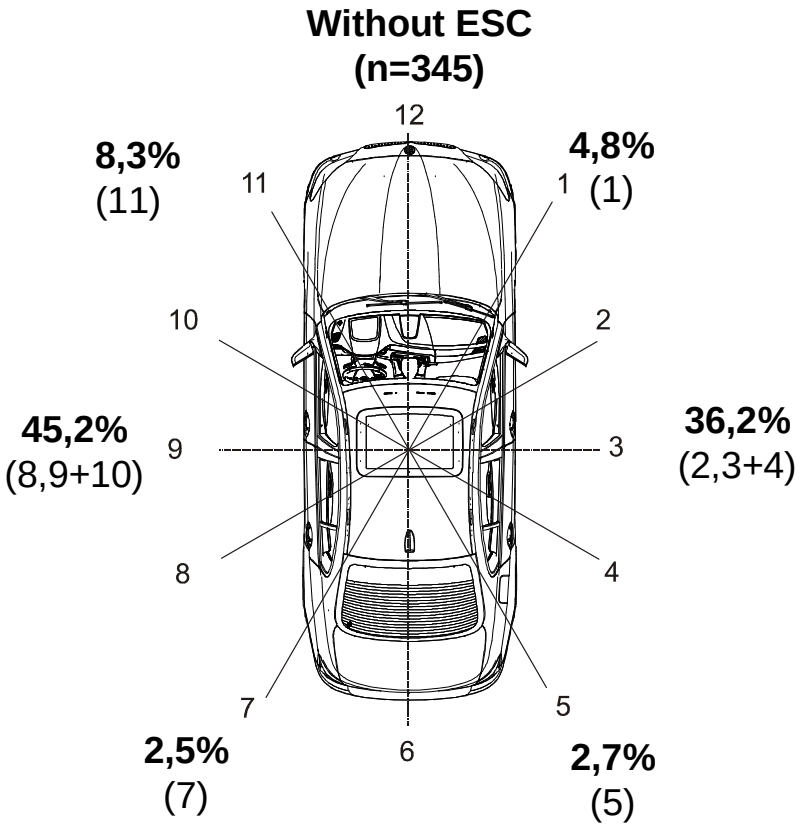


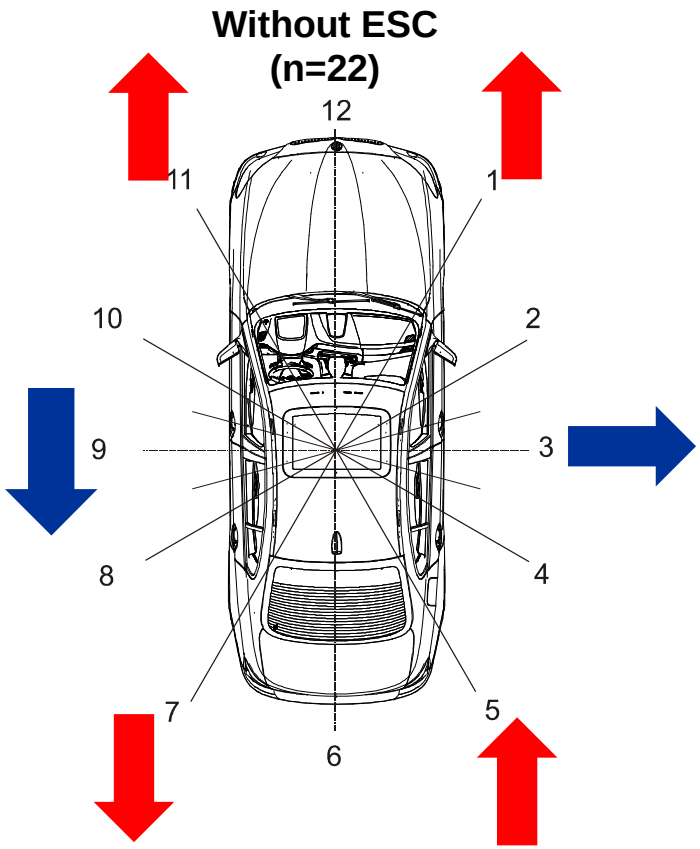
-The GIDAS Data show that once Pole Type Impacts occur vehicles fitted with Electronic Stability Control (here DSC) have a tendency towards oblique impact conditions.

-This is also confirmed by BMW internal accident research data.

Accident Analysis

Effect of Electronic Stability Control (ESC)





Relative distribution of impact areas on vehicles with and without Electronic Stability Control from GIDAS accident studies.

Vehicles with ESC show a tendency towards oblique impact directions.

Comparison of Vehicle Performance

Parameters of Comparison

The data compare identical vehicle platforms, each in 2 configurations:

-Designed for the 29 kph EuroNCAP Pole test with a 50% Male (ES-2)

-Designed for the 32 kph oblique Pole test with a 50% Male (ES-2re)

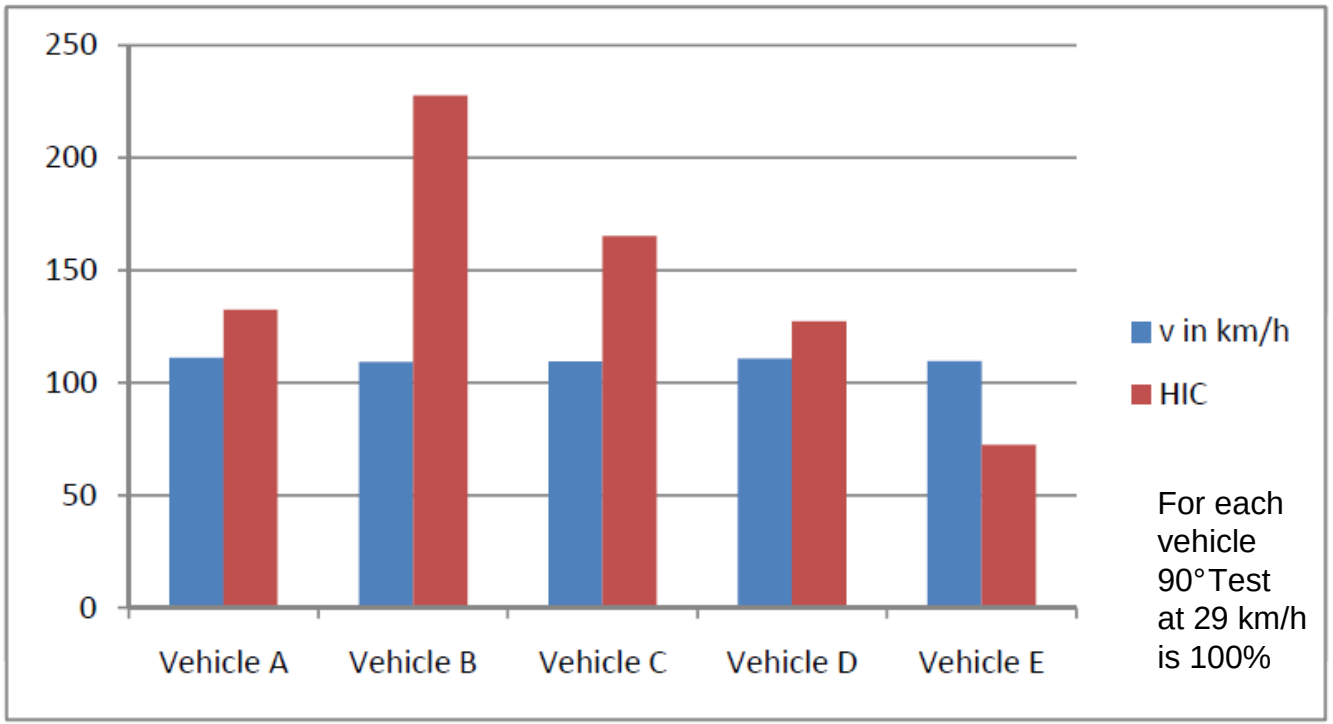
Each under the test procedures it was designed for.

The oblique Pole tested vehicles were fitted with advanced structure, restraints and safety electronics for best possible performance.

The data is normalized with the 29 kph 90° Test result always at 100% and separated into body regions for easier Reference.

Comparison of Vehicle Performance

State of the Art Vehicles – Head Protection

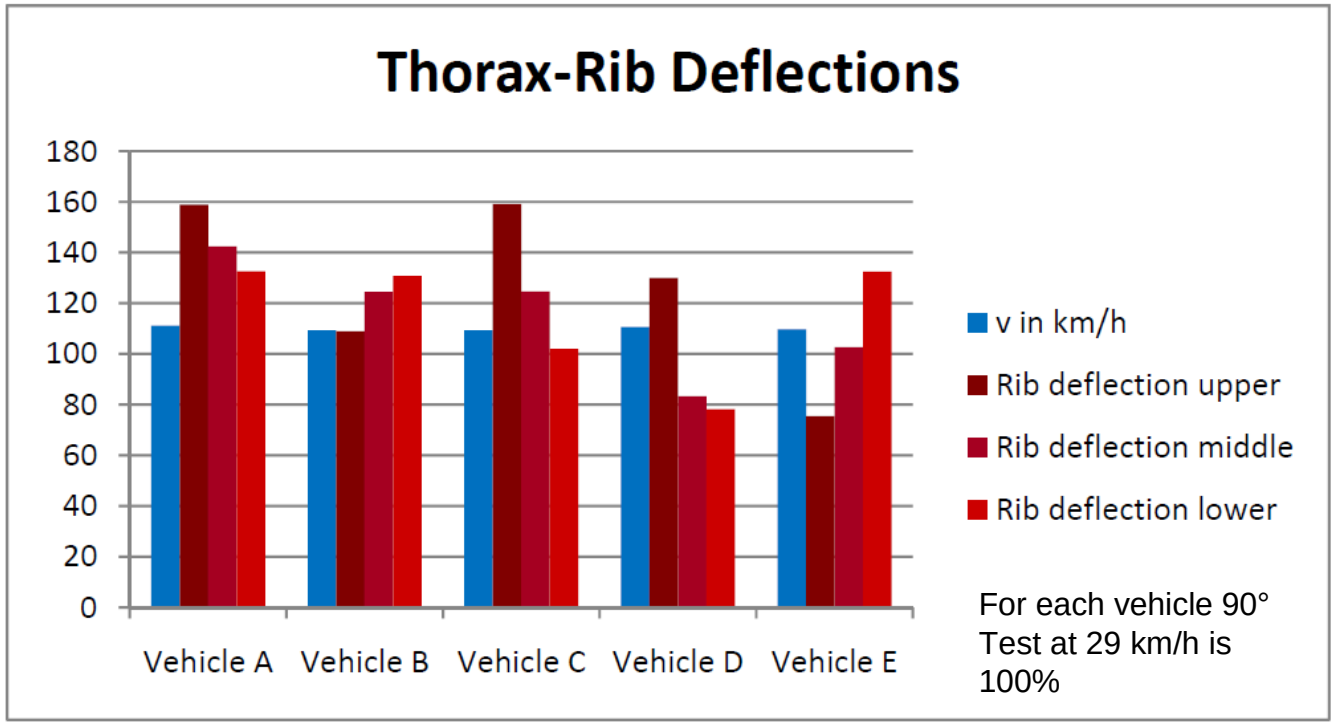


Test results of vehicles designed for 32km/h oblique condition compared to the same car designed for 29 km/h 90°. Perpendicular is always 100%.

In general the occupant loads in the 32 km/h oblique test show a higher increase than the speed compared to the 29 km/h 90° configuration.

Comparison of Vehicle Performance

State of the Art Vehicles – Rib Protection

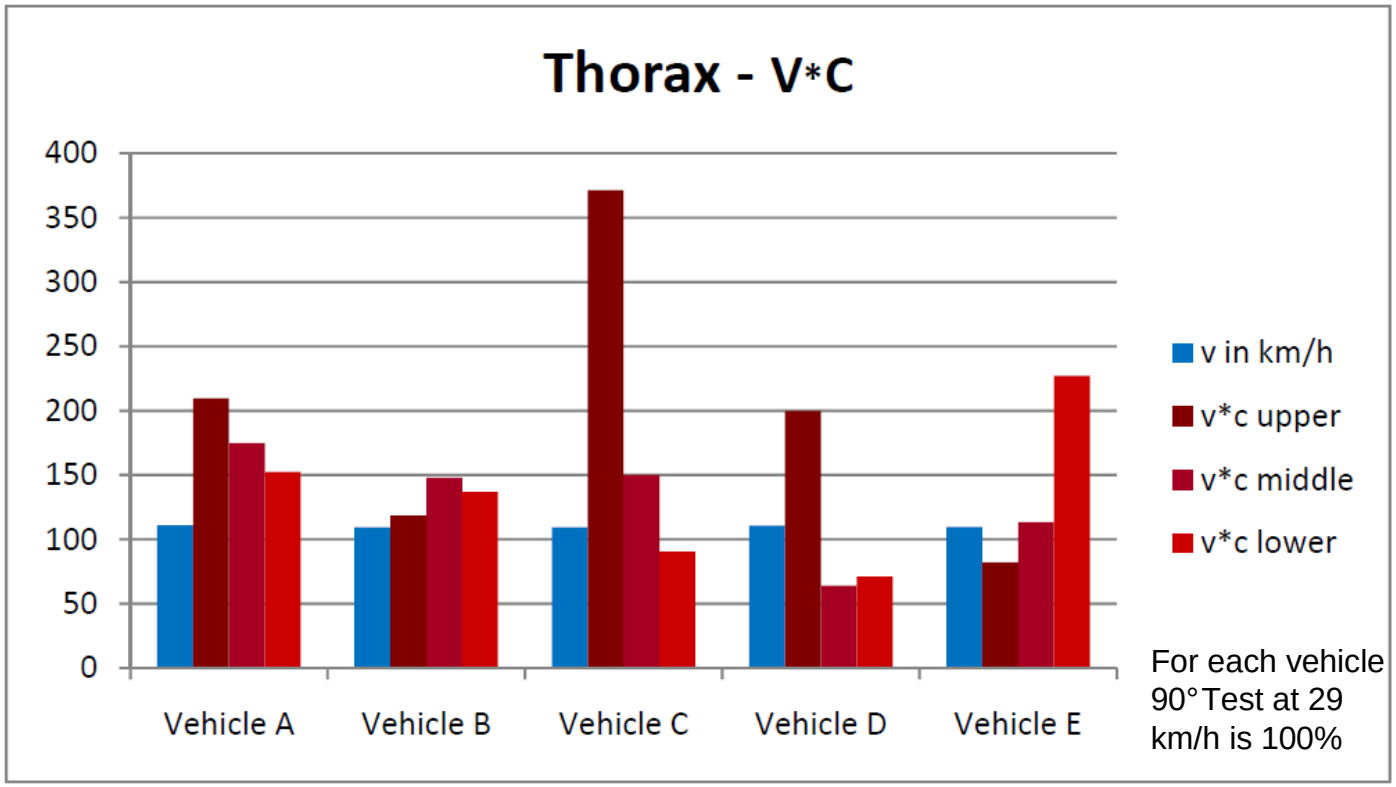


Test results of vehicles designed for 32km/h oblique condition compared to the same car designed for 29 km/h 90°.
Perpendicular is always 100%.

In general the occupant loads in the 32 km/h oblique test show a higher increase than the speed compared to the 29 km/h 90° configuration.

Comparison of Vehicle Performance

State of the Art Vehicles – Thorax VC

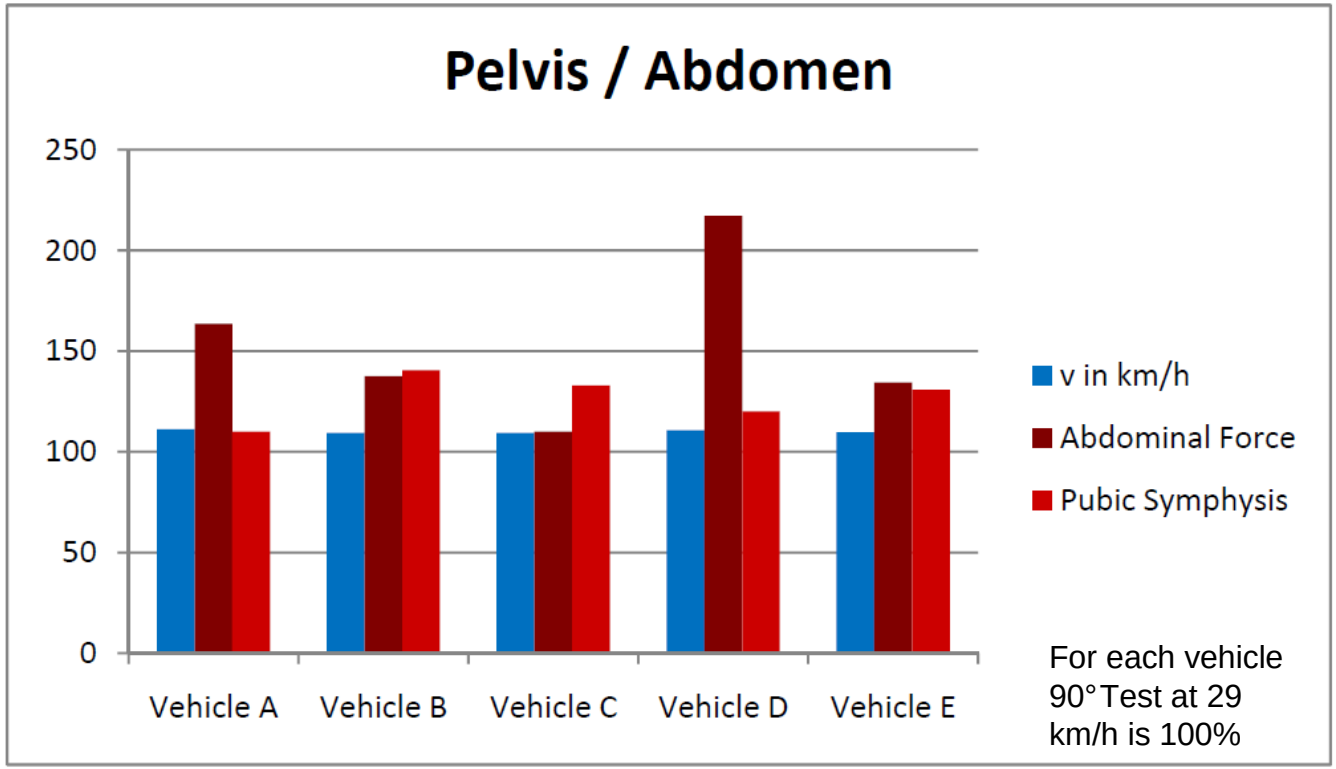


Test results of vehicles designed for 32km/h oblique condition compared to the same car designed for 29 km/h 90°. Perpendicular is always 100%.

In general the occupant loads in the 32 km/h oblique test show a higher increase than the speed compared to the 29 km/h 90° configuration.

Comparison of Vehicle Performance

State of the Art Vehicles – Pelvis/Abdomen



Test results of vehicles designed for 32km/h oblique condition compared to the same car designed for 29 km/h 90°. Perpendicular is always 100%.

In general the occupant loads in the 32 km/h oblique test show a higher increase than the speed compared to the 29 km/h 90° configuration.

Conclusions/Recommendations

Summary

Accident Analysis (GIDAS Data)

-Pole Type Side impacts are rare events.

-Even cases categorized as perpendicular in accident studies may actually have been oblique.

- The majority of Pole Impacts with injured occupants occur under somewhat oblique conditions

Effect of Electronic Stability Control on Pole Impact direction

- If Vehicles fitted with Electronic Stability Control are involved in Pole Type side impacts they show a tendency towards oblique directions.

Comparison of Vehicle Performance

- Even for vehicles that are specifically optimized for oblique configurations (at 32 k/h) the increase of occupant responses are higher than the increase of speed compared to the 90°29 km/h config uration.

Conclusions/Recommendations

Summary

Improved reliability for Airbag deployment under oblique conditions

-NHTSA Fleet testing performed to develop the current Pole Test Procedure for FMVSS 214 showed that even vehicles certified to meet the 90° Pole Test of FMVSS 201 had deployment issue s when tested under the 75° oblique conditions.

75° Oblique Pole Test procedure has proven to be pra cticable

- Phase in of the 75° Oblique Pole Test in the US is already underway. The Test Procedure employed so far has proven to be practicable yet more demanding than the 90° Test.