 Accident Data: Side Impacts with Poles

T. Langner, BASt
on behalf of
EEVC WG 13 and WG 21

Informal Group on a Pole Side Impact GTR (PSI)
Nov. 2010
European Enhanced Vehicle-safety Committee

Questions on pole side impact:
- Frequency of pole side impact?
- Severity of pole side impact?
- Injured body regions?
- Impact speed?
- Direction of force (including severity)?
- Diameter of pole?
- Damage area in pole side impacts?
- Occupant age distribution in pole side impacts?
- Effect of ESC?
GIDAS - Passenger car accidents by impact type, n=10,644, accidents to vulnerable road users excluded

- 38.5% Single front
- 25.7% Single side
- 12.7% Single rear
- 7.1% Car to others
- 11.7% Car to pole
- 1.4% Multiple impacts, no rollover
- 1.9% Rollover as unique event or as part of impact sequence

CCIS - Passenger car accidents by impact type n=10,377

- 43.5% Single front
- 14.9% Single side
- 19.9% Single rear
- 3.3% Car to others
- 4.4% Car to pole
- 12.1% Car to car
- 1.9% Multiple impacts, no rollover
- 1.9% Rollover as unique event or as part of impact sequence

Result:
Pole impacts are not very frequent
Frequency of pole side impact

Impact types among all side impacts

Pole | Car | PSV/LGV/HGV
---|---|---
UK | 4.5 | 53.7 | 12.6
France | 5.7 | 63.5 | 11.3
Sweden | 2.1 | 44.8 | 12.9

Result:
Pole impacts are not very frequent

National data
Result:
Pole impacts are very severe.
In UK similar amount of fatalities in “car to pole” as in “car to car”
**Injured body regions**

**GIDAS - AIS1+ injuries by body regions, belted occupants, n=420 injuries**
- Head and face: 31%
- Neck: 17%
- Thorax: 19%
- Abdomen: 4%
- Spine: 5%
- Upper ex: 4%
- Lower ex: 9%

**GIDAS - AIS3+ injuries by body regions, belted occupants, n=95 injuries**
- Head and face: 36%
- Thorax: 32%
- Abdomen: 14%
- Spine: 3%
- Upper ex: 4%
- Lower ex: 5%

**CCIS - AIS1+ injuries by body regions, belted occupants, n=980 injuries**
- Head and face: 27%
- Neck: 22%
- Thorax: 18%
- Abdomen: 16%
- Spine: 9%
- Upper ex: 6%
- Lower ex: 2%

**CCIS - AIS3+ injuries by body regions, belted occupants, n=233 injuries**
- Head and face: 38%
- Thorax: 38%
- Abdomen: 38%
- Spine: 38%
- Upper ex: 38%
- Lower ex: 38%

For all injury severities the head and thorax injuries are very dominant, for low severities also the spine is of importance.

EEVC Working Group 13 /21 Informal Group Pole Side Impact Nov. 2010 Slide 6
Impact speed

GIDAS - Cumulative impact speed by injury severity of belted occupants

Result:
- 50% of the occupants had a side to pole impact with an impact speed below 46 km/h
- 14 cases represent an impact configuration comparable to the Euro-NCAP pole test
Direction of force

GIDAS - Direction of force in pole impacts, n=150

impact to the left (driver)  impact to the right (passenger)

Result: Perpendicular is the most frequent impact direction
**Result:** Perpendicular is the most frequent impact direction
Direction of force including severity

GIDAS - MAIS of belted occupants by direction of force in pole impacts, n=103

Result:
Perpendicular is the most frequent AND most severe impact direction
**Direction of force including severity**

**CCIS** - MAIS of belted occupants by direction of force in pole impacts, n=106

- Impact to the left (passenger)
- Impact to the right (driver)

**Result:**
Perpendicular is the most frequent **AND** most severe impact direction
Diameter of Pole

**GIDAS** - Passenger car side impact to pole, 
diameter of pole, n=147

Current pole test diameter 25.4 cm

**Result:** The pole diameter in current legislation seems appropriate
European Enhanced Vehicle-safety Committee

Damage area in pole side impacts

GIDAS - Damage area, n=150

CCIS- Damage area, n=194

Result:
- The by far highest proportion (50%) of all pole impacted vehicles show damages exclusively in the passenger compartment.

- Fatal injuries normally only occur when passenger compartment is damaged.
Occupant age distribution in single side impacts

Result:
Marginal difference between male and female in CCIS, in GIDAS no difference between male and female

Result:
The 50% value is at about 32 years

FSO = Front seating occupant
**Occupant age distribution in pole side impacts**

**Result:**
Young man are most dominate in side to pole impacts.

**GIDAS – Age distribution in passenger cars with single side to pole**

**Result:**
The 50% value decreases from 32 years in all side impacts down to 24 years in pole side impacts.

**CCIS – Age distribution in passenger cars with single side to pole**

FSO = Front seating occupant
Result:
- Pole side impacts are reduced from 1.5 to 0.6% of all accidents
- Further analysis showed that ESC seems not to reduce the injury severity once an accident has happened
Questions and answers on pole side impact:

- Frequency of pole side impact?
  Rare

- Severity of pole side impact?
  Very severe => therefore of importance

- Injured body regions?
  Mainly head and thorax, also spine for low severity

- Impact speed?
  Often higher speeds but a speed around 30km/h seems reasonable

- Direction of force (including severity)?
  Perpendicular impacts occur with highest frequency AND highest severity
Questions and answers on pole side impact:

- Diameter of pole?
  
  254 mm seems reasonable (most frequent diameter in side pole impacts is between 210mm and 300 mm)

- Damage area in pole side impacts?
  
  Passenger compartment for 50% of all impacts and nearly for 100% of fatal injured occupants

- Occupant age distribution in pole side impacts?
  
  Young man have significantly often side pole impacts

- Effect of ESC?
  
  Number is small but some benefit is visible. If accident happens, ESC has no influence on injury severity.
### WG13 Membership

- B. Moran, chairman
- D. Francis, secretary
- M. Edwards, national representative UK
- St. Southgate, technical advisor UK
- J.-P. Lepretre, national representative France
- F. Duboc, technical advisor France
- M. Nombela, national representative Spain
- T. Versmissen, national representative Netherlands
- R. Puppini, national representative Italy
- D. Caiero, technical advisor Italy
- T. Langner, national representative Germany
- S. Binder, technical advisor Germany

### WG21 Membership

- P. Thomas, chairman
- R. Cuerden, national representative UK
- D. Otte, secretary / national representative Germany
- R. Sferco, technical advisor Germany
- G. Vallet, national representative France
- Y. Page, technical advisor France
- J. Strandroth, national representative Sweden
- Jr Paez, national representative Spain
- G. Della Valle, national representative Italy
- M. Giunti, technical advisor Italy
Thank you for your attention