



# **Detection Area for DPPS: Lateral Offset Lower Extremities vs. Head**

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During the 9th IWG DPPS meeting on 20&21 January 2021, the proposal for a sensor verification test drafted by a Task Force of the IWG was discussed (IWG-DPPS-9-04).

The proposal defines the width of the detection area as 75% of the relevant vehicle width, with equal shares on the LHS and the RHS of the car. The detection area is not linked to the width of the deployed area of the DPPS.

JASIC agreed in principle to the procedure but proposed to add that for cases where the sensing width being narrower than the detection area width, DPPS can only be activated within the sensing width (IWG-DPPS-9-09).

Rationale is the lateral offset between lower extremity impact and head impact after pedestrian “wrap around” would be negligible.

The group was tasked to examine indications regarding the possible lateral offset between lower extremities and head during vehicle to pedestrian accidents.

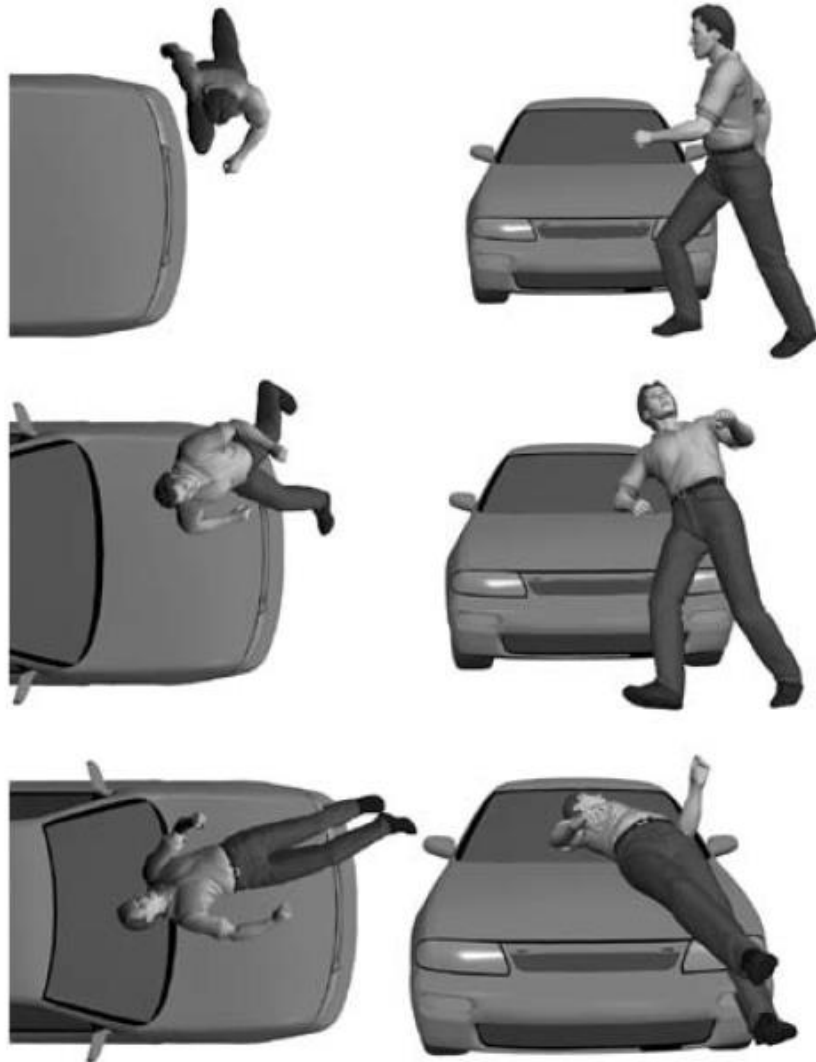


Fig. 25. Rotation of the victim's body in a car-to-pedestrian hit.

Source: Teresinski, G.: „Injuries of the Thigh, Knee, and Ankle as Reconstructive Factors in Road Traffic Accidents“

Prior to and during vehicle to pedestrian accidents, the pedestrian is normally in motion.

This motion is causal for the dent pattern with lateral offset that can be typically seen at many on-spot scenes.

For anatomical reasons only, lower extremity and head impacts are linked to each other, but without having a prescriptive attribute in terms of head impact location.



Data from the German In Depth Accident Study GIDAS was spot-checked for pedestrian accident data to illustrate real world trajectories.

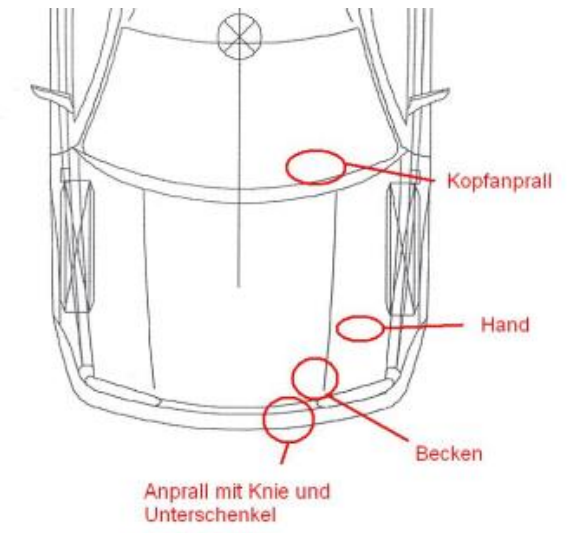
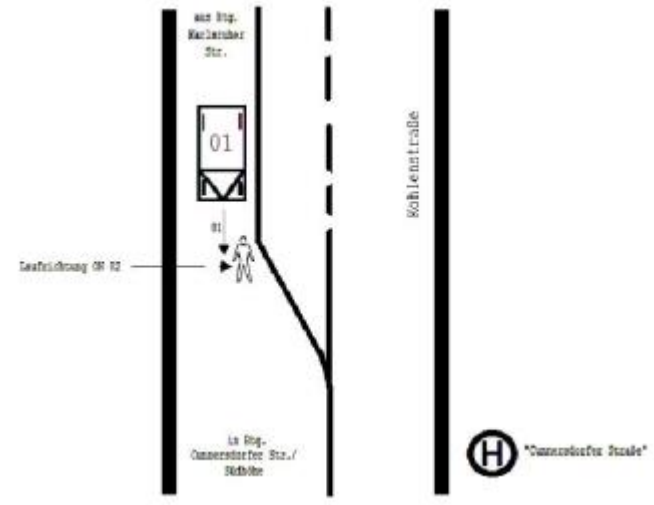
For a quick check, only initial pedestrian impacts against the center area (ANZONE\_M1) and the foremost point of the vehicle (ANMASSX=0) were taken into account.

Some of the accidents are briefly discussed.

# Case #1

Pedestrian: 67YO male,  
Severely injured (MAIS4)  
Pedestrian crossing the street (red light),  
Lateral collision with M1 (green light)

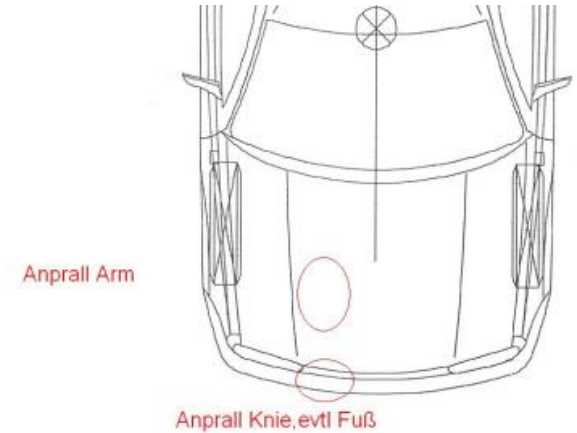
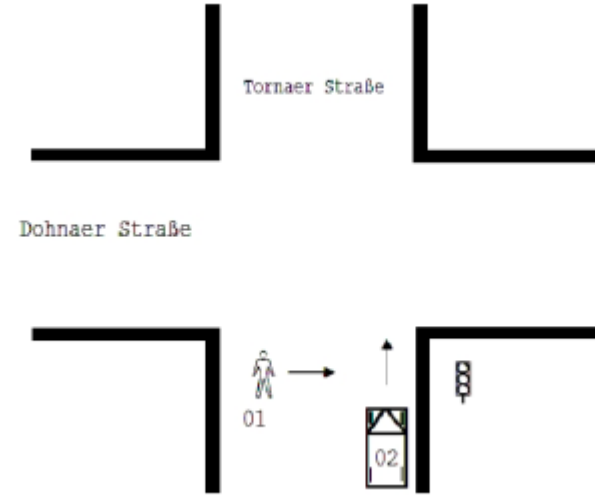
Passenger car:  
Collision speed 34km/h





Pedestrian: 54YO male,  
Severely injured (MAIS2)  
Pedestrian crossing the street (red light),  
Lateral collision with M1 (green light)

Passenger car:  
Collision speed 29km/h

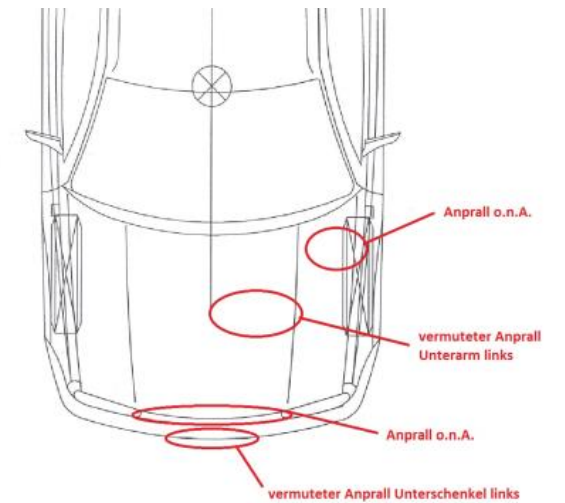
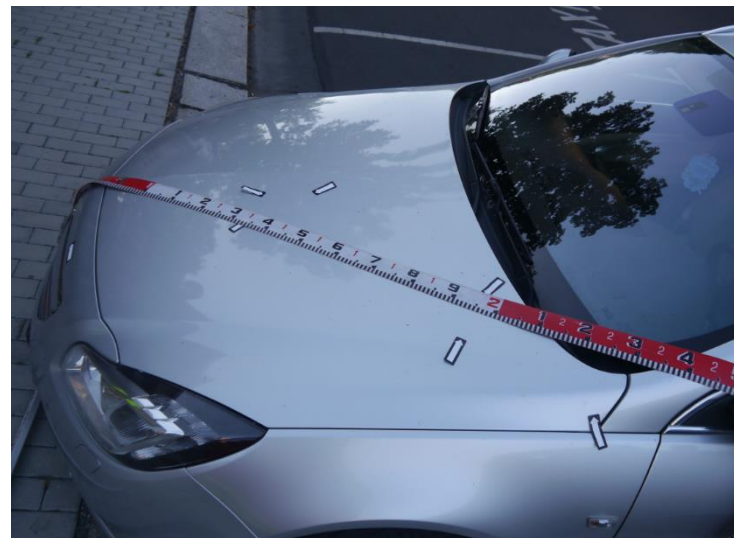
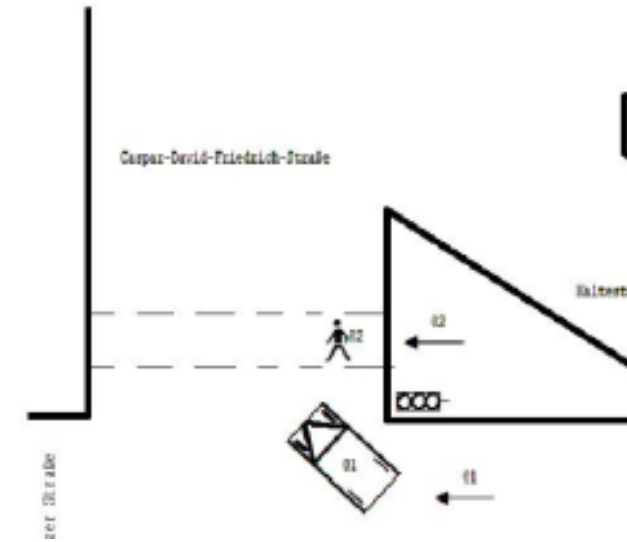




Pedestrian: 35YO male,  
MAIS2

Pedestrian crossing the street (green light),  
M1 turning w/ green light, overlooking way of right

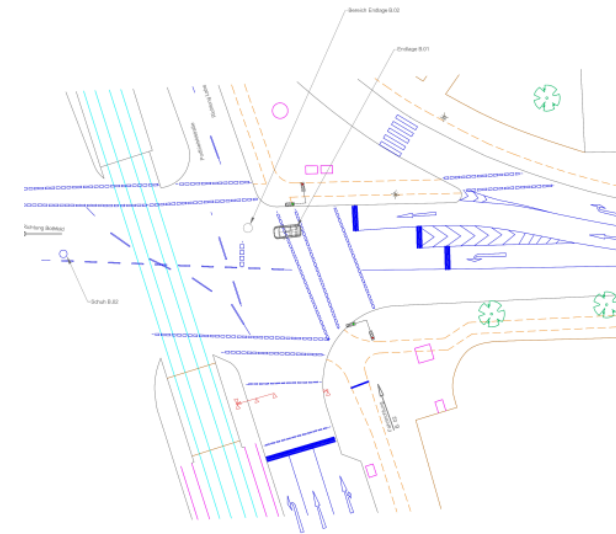
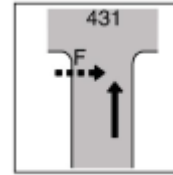
Passenger car:  
Collision speed 22km/h



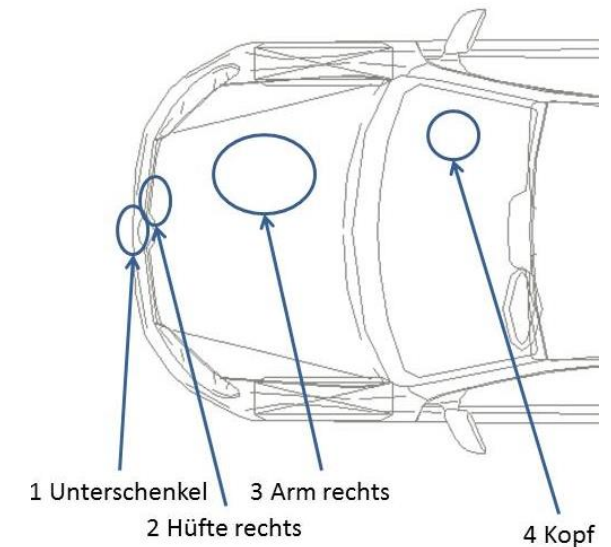
# Case #4



Pedestrian: 57YO female,  
Severely injured  
Pedestrian crossed the street,  
disregarding „red light“ signal  
Lateral collision w/ M1 approaching from RHS



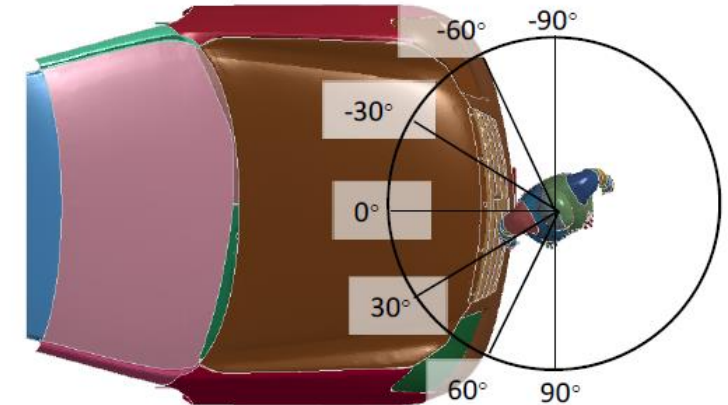
Passenger car:  
Collision speed 35km/h  
No braking





GIDAS sample still shows in a number of cases a significant lateral offset between the first impact and head impact on the vehicle.

„Perpendicular“ test conditions in a laboratory with stationary test specimen do not always reflect real world impact conditions such as e.g. crossing or turning scenario, trajectory or speed of the pedestrian etc.



Source: Chen, H. et al.: „PEDESTRIAN RESPONSE WITH DIFFERENT INITIAL POSITIONS DURING IMPACT WITH A MID-SIZED SEDAN “. ESV Paper Number 15-0391

It thus cannot be assumed that the lateral offset is to the highest extent marginal.

There is no prescriptive link between first vehicle contact and head contact location on the vehicle.

A fixed detection area width seems the best and most pragmatic way forward.



Thanks!