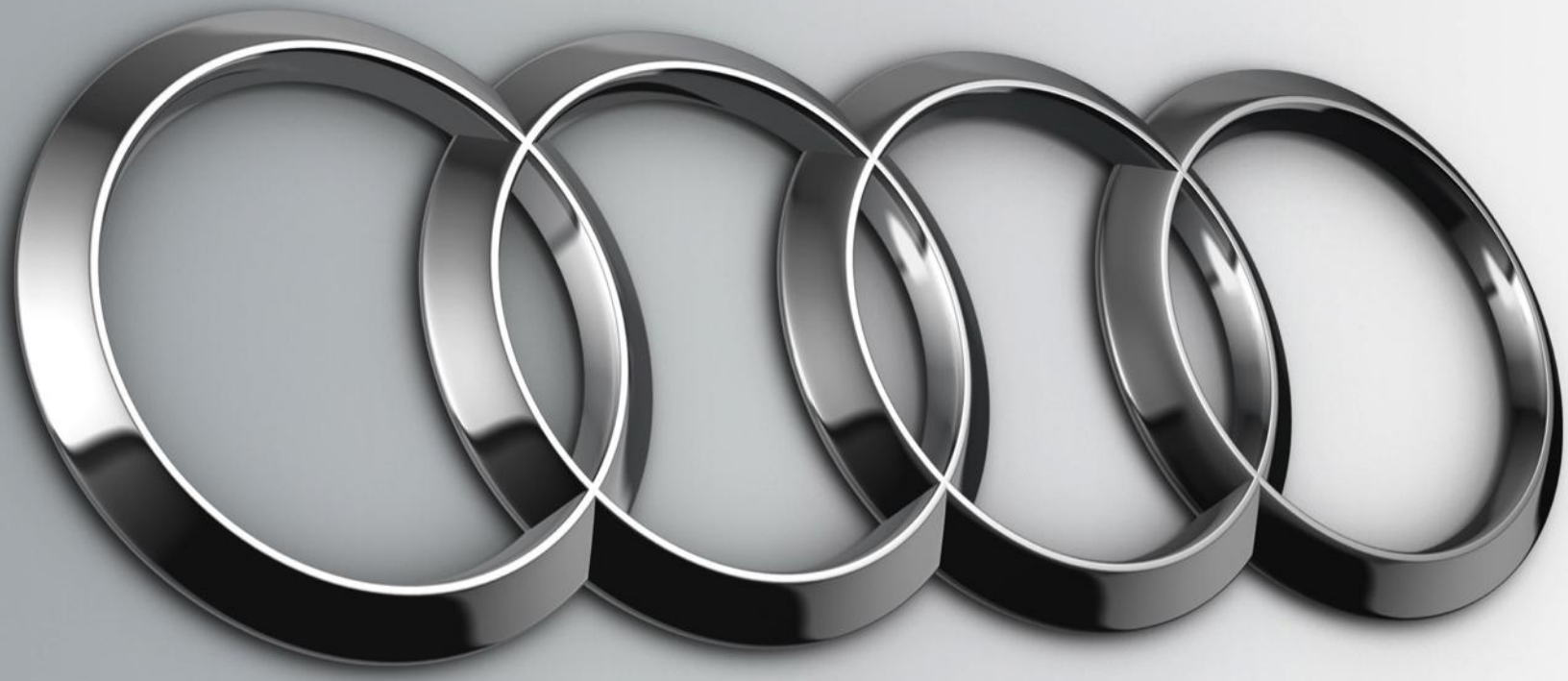
TF-BTA-7-09r1

Audi
Vorsprung durch Technik



Injury Risk of Lower Leg outside of 30° Tangent-Area
- updated version -

Alexandra Fries, I/EK-551; Thomas Schenk, I/GG-32;
Franz Roth, I/EK-551

Agenda

- Aim of the study
- Accident data filter
- Definition AISUSKNIE
- Car to pedestrian frontal accidents (398)
- Definition BTA
- Accidents AISUSKNIE2+
- Accidents with market launch after 2006 (all AISUSKNIE)

Pedestrian Accidents with Leg Injuries
- Aim of the study -

- Open Item: Comparison of the injury risk inside/outside 30° COB

5. Review of Open Items from the 5th Meeting
(all)
(Document TF-BTA-5-02, agenda item 7)

The action items agreed in the previous session were individually reviewed (TF-BTA-5-02, agenda item 7) and were all considered closed:

BASt: Double-check whether it is possible to do a case by case assessment for the widening of the test area (see agenda item 5).

Mr. Zander explained that BASt did not carried out a case-by-case analysis since this was considered to be too time consuming and might have slowed down the progress of this group. However, he announced to show some details from accident data that should be able to explain issues with the widening.

Pedestrian Accidents with Leg Injuries
- Accident data filter -

- Pedestrian accidents 2002 – 2013 from GIDAS Database

M1 to pedestrians (Passenger cars with SUV, van, mini-bus, pickup)	1831
First registration of passenger car > 2000	758
w/o multiple collisions	687
Frontal	415
AUSUSKNIE known	398
AISUSKNIE2+	71
Injuries caused by car *	67

Pedestrian Accidents with Leg Injuries
- Definition AISUSKNIE -

- AISKNIEUS describes injury severity in body regions knee and lower leg

- AISKNIEUS is evaluated from AIS values of individual injuries in the lower leg area (variable SITZ with values 716-720, 733-734)

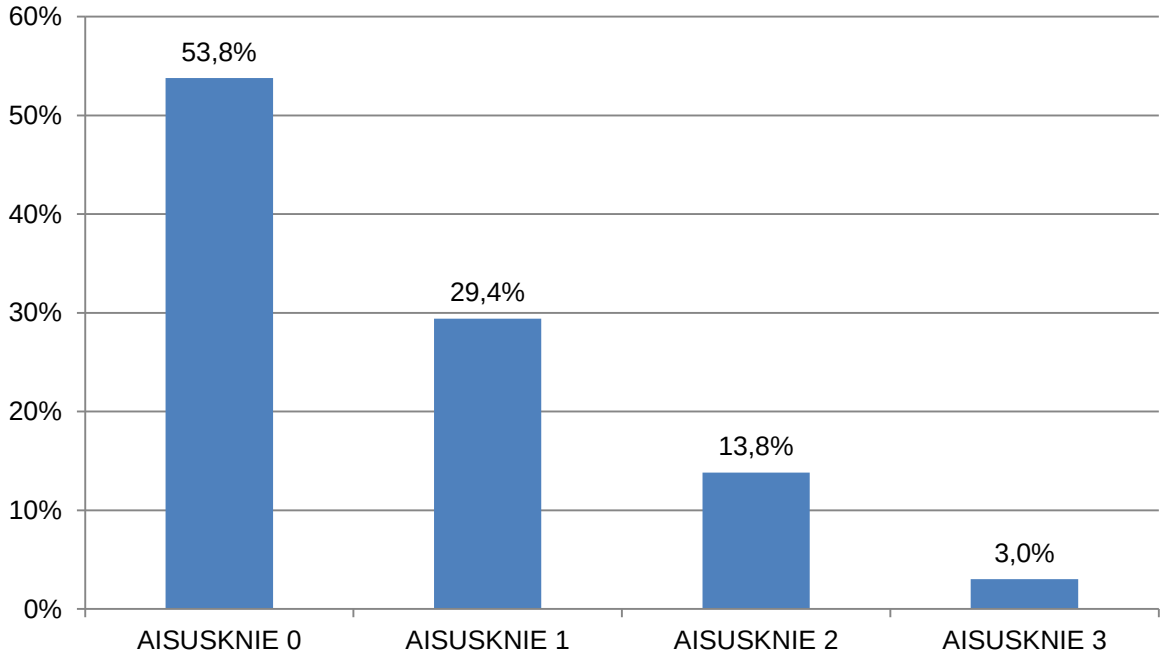
- Extraction of relevant injuries from GIDAS:

716 - Patella, knee
717 - Lower leg
718 - Fibula
719 - Tibia
720 - Head of tibia
733 - Collateral ligaments
734 - Cruciate ligaments

- * without injuries during post-crash movement (exlusion of GIDAS parameter NRK 77)

Pedestrian Accidents with Leg Injuries
- Car To Pedestrian Frontal Accidents (398) -

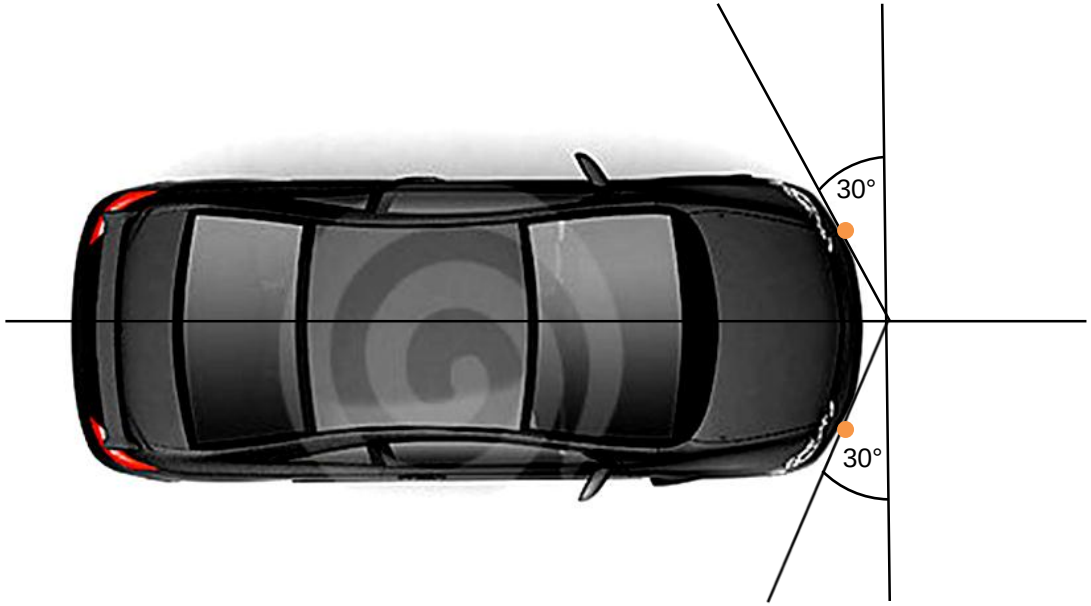
- **2002-2013:** 398 frontal pedestrian accidents (total)
- Distribution of AISUSKNIE
  - Maximum severity of AISUSKNIE = 3



- **Large majority of cases (≈83%) shows no injury or slight injuries**

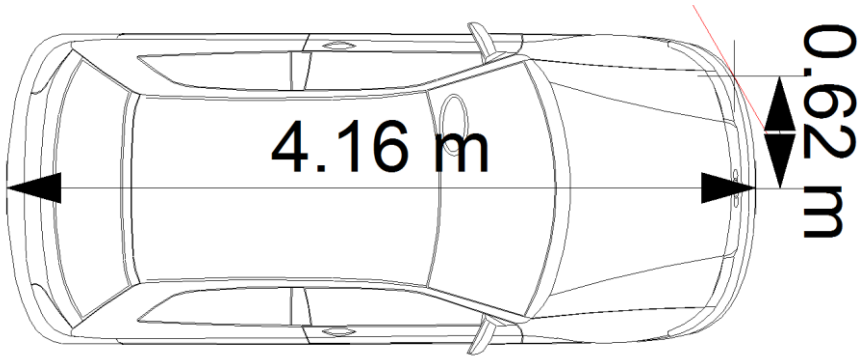
Pedestrian Accidents with Leg Injuries
- Identification of the bumper test area -

- 30° tangent at front end of the car

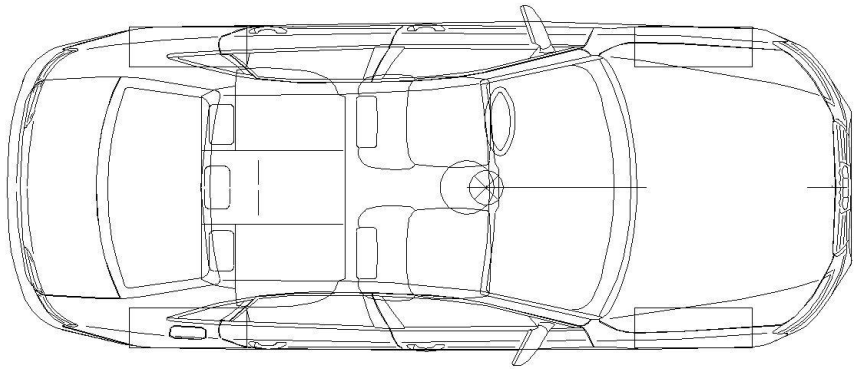


Pedestrian Accidents with Leg Injuries
- Identification of the bumper test area -

- Source: Geometric models available for the accident reconstruction software
  - High degree of detail, accuracy of determination ± 10 mm
- Example AUDI A3

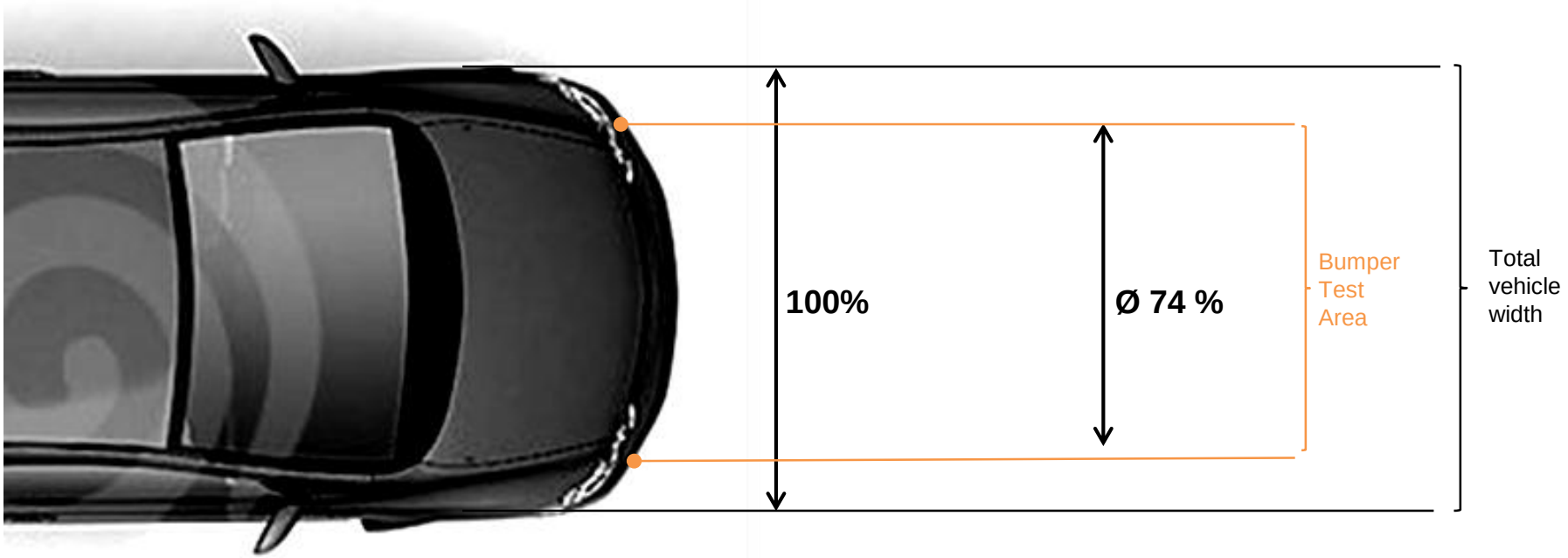


- Example AUDI A4



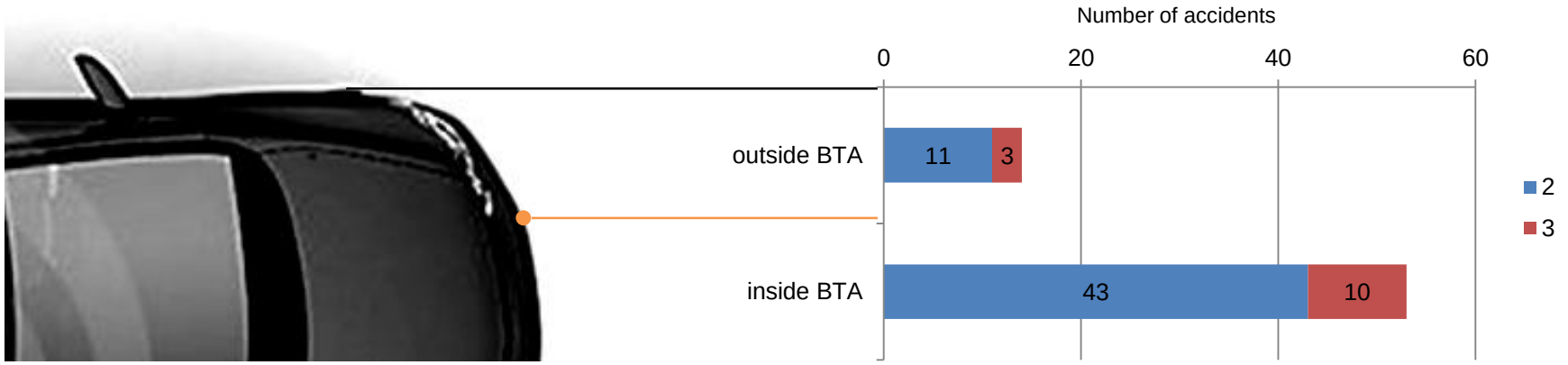
Pedestrian Accidents with Leg Injuries
- Dimensions of the BTA -

- Average size of the BTA: 74% of vehicle width



Pedestrian Accidents with Leg Injuries
- Accidents with AISUSKNIE 2+

- Absolute distribution of all accidents



- A trend to lower frequency of severe accidents in the outer area can be seen in relation to the test area

Pedestrian Accidents with Leg Injuries
- Accidents with market launch after 2006 -

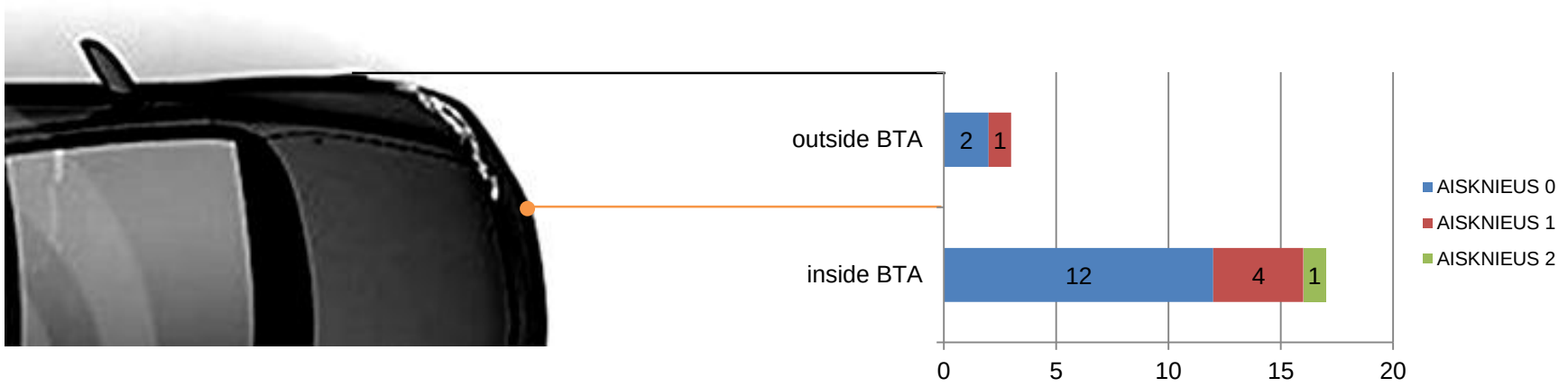
- Legislation concerning pedestrian protection: 10/2005

- Accidents Data filter

Pedestrian accidents 2002 – 2013 from GIDAS	
M1 to pedestrians (Passenger cars with SUV, van, mini-bus, pickup)	1831
First registration of passenger car > 2000	758
w/o multiple collisions	687
Frontal	415
AISUSKNIE known	398
Caused by car	67
Market launch > 2006	**20**

Pedestrian Accidents with Leg Injuries
- Accidents with market launch after 2006 -

- Contact point outside BTA: 3 accidents
- Contact point inside BTA: 17 accidents



- No severe injuries (AISKNIEUS) can be found in GIDAS outside the currently defined bumper test area for modern cars with a market launch after 2006

Changes in Presentation (Original Version to Updated Version)

Accident Data Filter (Slide 4)

- 71 accidents with AISUSKNIE 2+:
  - 67 accidents for which injuries were caused by the car
  - 4 accidents (1100326, 30100476, 30110036, 3011956):
    AISUSKNIE2+ but injuries occurred during post-crash movement
    → so AISUSKNIE for injuries caused by the car is zero for these accidents

Definition AISUSKNIE (Slide 5)

- → exclusion of injuries caused during post-crash movement, just injuries caused by the car

Car To Pedestrian Frontal Accidents (398) (Slide 6)

- Consideration of only those accidents in which AISUSKNIE is known

Accidents with market launch after 2006 (Slides 11, 12)

- 20 instead of 21 accidents with market launch after 2006:
- Case 30130062: AISUSKNIE2 but the accident was not a frontal crash (pedestrian was hit by the car's door) --> no consideration