Submitted by the expert from Republic of Korea

Informal document GRSP-67-11
67th GRSP, 20 - 23 July 2020

Agenda item 12

Korea Opinion on UN R127 Amendment Proposal (GRSP-2020-09e)

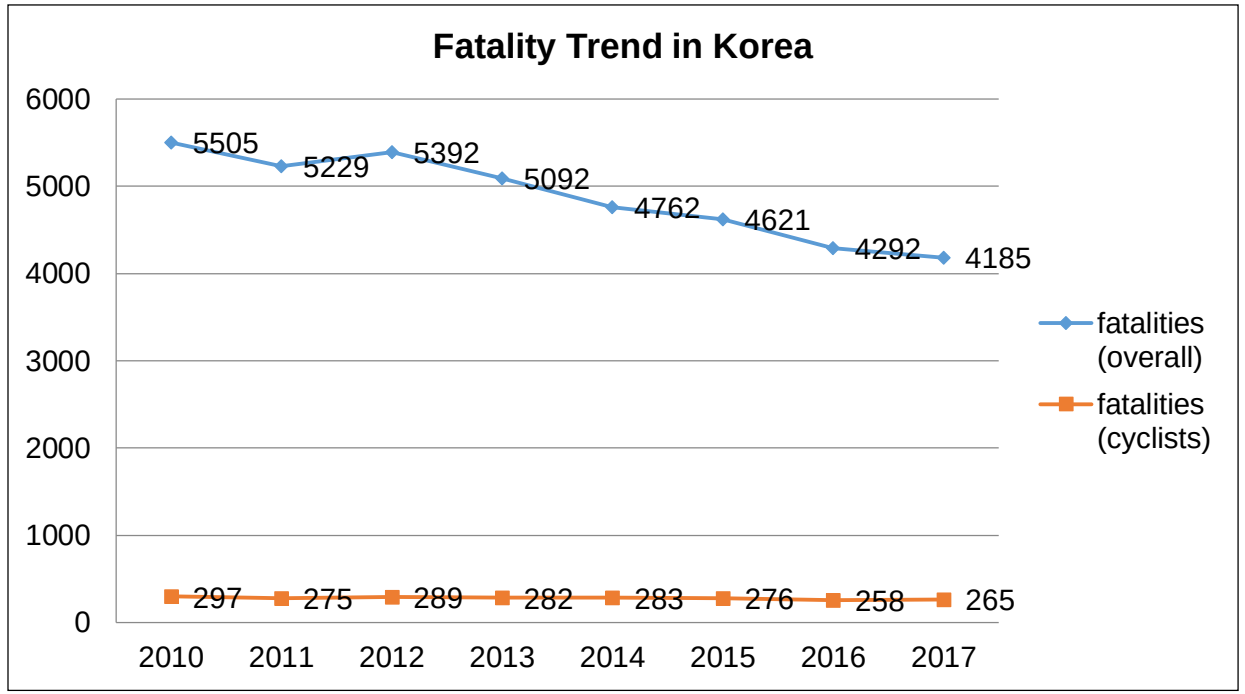
Ministry of Land, Infrastructure and Transport
Korea Automobile Testing & Research Institute
of Korea Transportation Safety Authority

2020.7.

Introduction

- UN R127 amendment proposal has been submitted by EC for 67th GRSP meeting(GRSP-2020-09e)
- The amendment proposal is mainly about the extension of head test area and may influence GTR No.9 amendment in the future
- Republic of Korea would like to share an opinion on the amendment contents with simulation research results regarding the head test area extension

Background



(KoROAD, Traffic Accident Statistics Report)

► **Fatalities (overall)**

: 24% decreased (2010 → 2017)

► **Fatalities from cyclists**

: 10.8 % decreased (2010 → 2017)

► **Ratio of cyclist fatalities**

: 5.4% → 6.3% increased (2010 → 2017)

► **Accident analysis**

: mostly side impact cases (81.7%)

: mostly passenger vehicles (93%)

: many cases in junction area (60%)

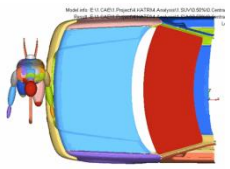
***Gyeonggi province, n=500, 2014~2018**

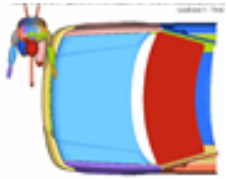
- KNCAP needs to consider the current traffic accident status and safety demand (Pedestrians → Vulnerable Road Users)
- Approach: extension of headform test area → Study(from 2018)

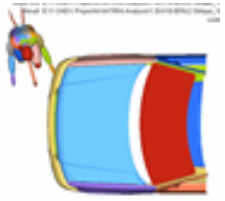
Car-to-Cyclist Crash Simulation

Simulation scenarios

<table>
<tr><th>Vehicle</th><th>Rider</th><th colspan="2">Impact Condition</th><th>Others</th></tr>
<tr><td>Small-sized Sedan</td><td rowspan="2">50% M</td><td>Center & Perpendicular

(vehicle speed: 40km/h,
bicycle speed: 15km/h)</td><td>  </td><td rowspan="3">Pedal position: UP
  </td></tr>
<tr><td>Mid-sized Sedan</td><td>Outmost & Perpendicular

(vehicle speed: 40km/h,
bicycle speed: 15km/h)</td><td>  </td></tr>
<tr><td>SUV</td><td>95% M</td><td>Oblique(15 degrees)

(vehicle speed: 25km/h,
bicycle speed: 15km/h)</td><td>  </td></tr>
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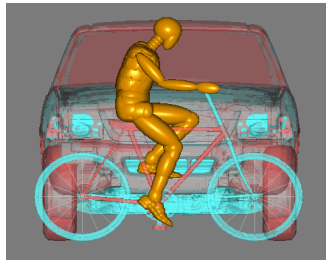
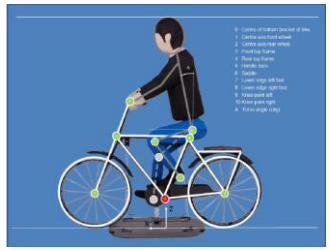
Bicycle model



Dimension:
corresponding to Bicyclist Target for AEB



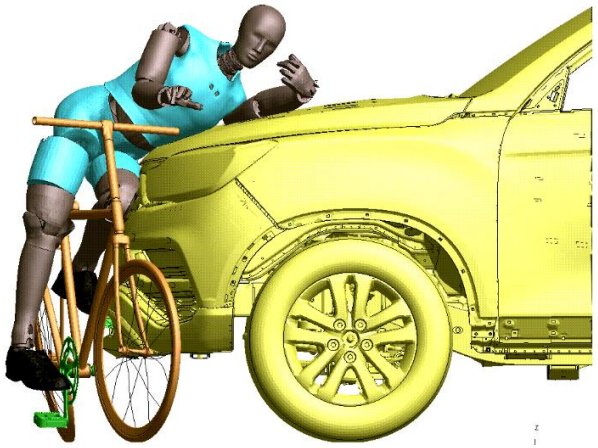
Car-to-Cyclist Crash Simulation

- KATRI simulation (2018)
  - rider: Madymo 50%M, 95%M
  - vehicle: open source models
  - head impact position
    : sedan→ WAD 2104~2427
    : SUV→ WAD 1641~1784
- Manufacturers simulation (2019)
  - rider: Hybrid-3 50%M, 95%M
  - vehicle: real car models in the market
  - head impact position
    : sedan→ WAD 2020~2550
    : SUV→ WAD 1753~2250

Case – vehicle height and head impact position

- SUV 1 (BLE height: 1068 mm) by KATRI
  - vehicle: open source model
  - head impact location : WAD 1641~1784

- SUV 2 (BLE height: 1073 mm) by OEM
  - vehicle: real car model in the market
  - head impact location : WAD 1753~1910



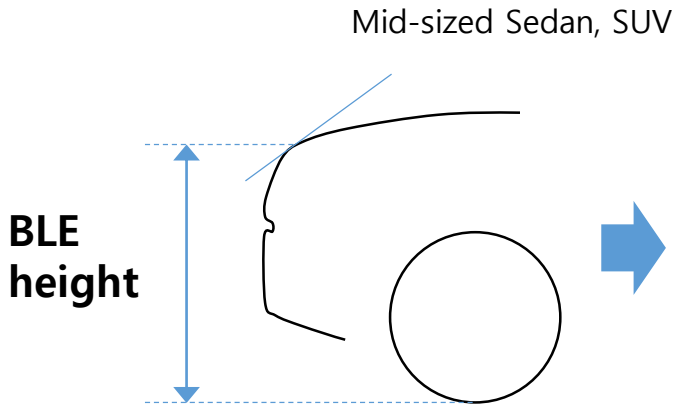
Correlation – vehicle height and head impact position

- BLE height change
  825 mm

  +25mm increase

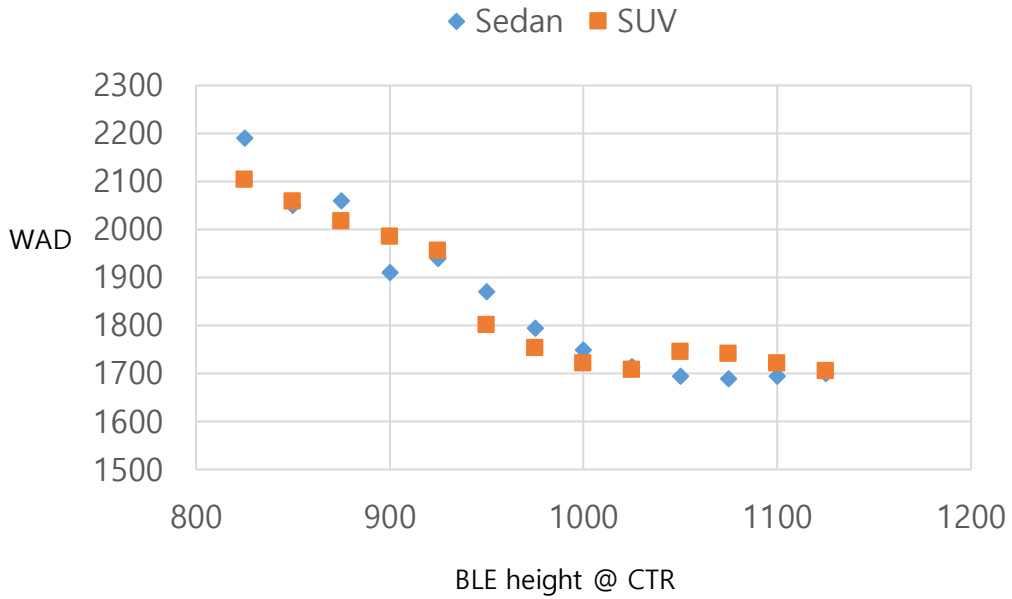
  1125 mm

- Head impact position (in WAD)



CTR Perpendicular impact (v=40km/h)

* H-point height(cyclist): 1035 (±10) mm



- Observed result
  - In case the BLE height is higher than the H-point height of the cyclist, the head impact point location(WAD) seems unchanged and below WAD 2100

Opinion

- Rear extension boundary(WAD 2500) in UN R127 amendment proposal(GRSP-2020-09e) is an appropriate level
- However, based on the simulation result, head impact positions of cyclists beyond WAD 2100 are unlikely to occur in case of vehicles with high front design like large SUVs
- Republic of Korea would like to propose WAD 2100 (current limit) as the rear extension boundary in case that the vehicle has a higher BLE height than [1035 mm]
  - proposal: GRSP-2020-9e + additional provision for exception
  - other parameters and standards are considerable instead of BLE height(@CTR) and the square value