Traffic Safety /Motorcycle Safety Session

Chairmen:  
- Prof. Danardono, UI  
- Dr. Ario Sunar Baskoro  
- Mr. Ganesha Tri Chandrasa, BPPT  
- Mr. Osamu Takatori, JARI
2nd Asia Automobile Institute Summit
25-26 November 2013, Bali

Agenda

1. Opening remark, chairman < 25 (minutes) Overview of Traffic Accident in Indonesia (Prof. Danardono)

2. Presentation by JARI (25 minutes, including Q&A)
   For realization of traffic safety - What should we do first?

3. Presentations by ARAI (25 minutes, including Q&A)
   Two wheeler safety in India

4. Presentations by MIROS (25 minutes, including Q&A)

5. Presentations by TAI (25 minutes, including Q&A)
For realization of traffic safety

- What should we do first? -

Osamu TAKATORI
JARI Safety Research Dev.

2nd Asia Automobile Institute Summit
25-26 November 2013, Bali
Contents

1. Review of Japanese accident data
2. Accidents of motorcycles in Japan
3. General approach towards safety measures
4. An example of accident data analysis and safety measures
   Pedestrian safety
5. Conclusion
1. Review of Japanese accident data
Annual transition of accidents in Japan

Reference: National Police Agency website
Number of vehicles in use in Japan

Reference: Ministry of Land, Infrastructure, Transport and Tourism website
Road traffic infrastructure 1

Reference: Ministry of Land, Infrastructure, Transport and Tourism website
Road traffic infrastructure 2

Reference: Ministry of Land, Infrastructure, Transport and Tourism website
Road traffic infrastructure 3

Reference: Ministry of Land, Infrastructure, Transport and Tourism website
Annual transition of accidents in Japan

Reference: National Police Agency website
Reduction in deaths after implementing vehicle safety measures

<table>
<thead>
<tr>
<th></th>
<th>The reduction of deaths within 30 days 1999 to 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full frontal crash</td>
<td>1,428</td>
</tr>
<tr>
<td>Side impact</td>
<td>364</td>
</tr>
<tr>
<td>Offset frontal crash</td>
<td></td>
</tr>
<tr>
<td>Pedestrian head protection</td>
<td>179</td>
</tr>
<tr>
<td>Others</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,977 less deaths</strong></td>
</tr>
</tbody>
</table>

2. Accidents of motorcycles
Fatalities according to type

- Motor vehicle occupant
- Motorcycle rider
- Pedal cyclist
- Pedestrian
- Others

Reference: National Police Agency website
Number of motorcycles sales

Reference: Japan Automobile Manufacturers Association, Inc. website
Measures for accidents of motorcycles in Japan

• In Japan, concrete measures have not been established because motorcycle accidents show a downward trend, and because of difficulty and cost in installing any measures
3. General approach towards safety measures
"What should we do first?"

• What has happened?

• In what quantity?

• Why has it happened?
For effective measures

1. The actual conditions of accidents are investigated.

2. The effects in advance are predicted. Effective measures are chosen based on the results.

3. Selected safety measures are implemented.

4. It is checked whether the expected effect is acquired.
3 elements of traffic accidents
Accident database in Japan

• Traffic accidents database (J-TAD)
  – Macro DB
    Investigation for all the accidents resulting in injury or death which occur in Japan (0.7 Million accidents per year)
  – Micro DB
    In-depth accident DB (300 accidents per year)

• Medical and engineering network accident DB
  Detailed medical information is added to micro (20-30 accidents per year)
Macro accident DB

• It is based on the accident investigative information from the police

• Related data (driver's license, car registration, traffic census) are integrated

• It is managed by ITARDA

ITARDA: Institute for Traffic Accident Research and Data Analysis
Established by the Ministry of Land, Infrastructure and Transport + the Police Agency
Micro accident DB

• Information about the vehicles' deformation, collision speed, and injury (AIS) are included.

• Sketches and photographs of the scene of accidents, and photographs of accident vehicles are included.

• It is managed by ITARDA.
Medical and engineering network accident DB

- JARI and ITARDA jointly investigate accidents, obtaining cooperation of the rescue staff and the hospital

- One feature is that detailed medical data and ambulance use are included
Accident analysis by medical and engineering network

Vehicles
- Deformation
- Collision speed
- Safety device

Users
- Position
- Age, sex, physique
- Injury
- Medical data

Infrastructure
- Road
- Traffic

Analysis from both sides of medicine and engineering
↓
Injury mechanism
Analyzing factors of accidents, and measures

1. A typical accident is extracted using the macro accident DB

2. The detailed analysis of a typical accident is analyzed using the micro accident DB

3. Measures based on the factor of accidents are implemented
4. An example of accident data analysis and safety measures

Pedestrian safety
Fatalities in Japan (2012)

(Fatalities within 30 days)

Others 0%
Motor vehicle occupant 32%
Motorcycle rider 18%
Pedal cyclist 13%
Pedestrian 37%

International pedestrian protection testing methods

Main Targets

- Head Protection Test Methods/Regulations (for Adults and Children)
- Leg and Knee Protection Test Methods/Regulations (for Adults)
## Body part of a pedestrian's injury (Micro)

<table>
<thead>
<tr>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Head</td>
<td>32.7%</td>
<td>29.9%</td>
<td>28.9%</td>
<td>39.3%</td>
<td>31.4%</td>
</tr>
<tr>
<td>Face</td>
<td>3.7%</td>
<td>5.2%</td>
<td>2.2%</td>
<td>3.7%</td>
<td>4.2%</td>
</tr>
<tr>
<td>Neck</td>
<td>0.0%</td>
<td>1.7%</td>
<td>4.7%</td>
<td>3.1%</td>
<td>1.4%</td>
</tr>
<tr>
<td>Chest</td>
<td>9.4%</td>
<td>11.7%</td>
<td>8.6%</td>
<td>10.4%</td>
<td>10.3%</td>
</tr>
<tr>
<td>Abdomen</td>
<td>7.7%</td>
<td>3.4%</td>
<td>4.7%</td>
<td>4.9%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Pelvis</td>
<td>5.3%</td>
<td>7.9%</td>
<td>4.4%</td>
<td>4.9%</td>
<td>6.3%</td>
</tr>
<tr>
<td>Arms</td>
<td>7.9%</td>
<td>8.2%</td>
<td>9.2%</td>
<td>8.0%</td>
<td>8.2%</td>
</tr>
<tr>
<td><strong>Lower Limbs</strong></td>
<td><strong>33.3%</strong></td>
<td><strong>31.6%</strong></td>
<td><strong>37.2%</strong></td>
<td><strong>25.8%</strong></td>
<td><strong>32.6%</strong></td>
</tr>
<tr>
<td>Unknown</td>
<td>0.0%</td>
<td>0.4%</td>
<td>0.0%</td>
<td>0.0%</td>
<td>0.2%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Source: IHRA/PS WG 2001 report
The injured part of the pedestrian lower limb (Micro)

<table>
<thead>
<tr>
<th>AIS 2-6</th>
<th>Ages &gt; 15 (Adult)</th>
<th>Ages &lt; 16 (Child)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall</td>
<td>Thigh</td>
</tr>
<tr>
<td><strong>Contact Location</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Front Bumper</strong></td>
<td>1.6%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Top surface of bonnet/wing</td>
<td>2.1%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Leading edge of bonnet/ wing</td>
<td>4.7%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Windscreen glass</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Windscreen frame/ A pillars</td>
<td>0.5%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Front Panel</td>
<td>0.9%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Others</td>
<td>0.6%</td>
<td>0.4%</td>
</tr>
<tr>
<td><strong>Sub-Total</strong></td>
<td>10.5%</td>
<td>8.0%</td>
</tr>
</tbody>
</table>

source: IHRA/PS WG 2001 report
JARI: Accident reproduction using Computer Aided Engineering

Lower

Middle

Upper

Sedan

SUV

Minivan
United Nations GTR, Phase 2
(Global Technical Regulation)

**Headform Tests**
- **Impactor:** ISO Adult Headform
  - **Vel.:** 35 km/h
  - **Ang.:** 65 deg.
- **Impactor:** ISO Child Headform
  - **Vel.:** 35 km/h
  - **Ang.:** 50 deg.

**Legform Test**
- **Impactor:** Flexible Pedestrian
  - **Vel.:** 40 km/h
  - **Ang.:** 0 deg.

**(a) LBRLH: less than 425 mm**

**(b) LBRLH: 425 mm and over**

Lower Bumper Reference Line Height (LBRLH)

**Legform Test**
- **Impactor:** EEVC Upper Legform
  - **Vel.:** 40 km/h
  - **Ang.:** 0 deg.

**(or)**

**Headform Tests**
- **Impactor:** ISO Adult Headform
  - **Vel.:** 35 km/h
  - **Ang.:** 65 deg.

**(or)**

- **Impactor:** ISO Child Headform
  - **Vel.:** 35 km/h
  - **Ang.:** 50 deg.
Safety education for children

• Traffic safety education using a computer
  – The patterns of typical accidents are extracted from analysis of micro accident data and hearing data
  – 16 kinds of scenarios are set
    • In shadow of parked vehicles
    • Not checking signals
    • Not checking right-and-left
  – The effect was proved at an elementary school near JARI

Self protection

- Head protection cap

**Rate of parts causing head injury AIS 2-6**

- Road (20.2%)
- Bumper
- Bonnet
- Fender
- Food edge
- Others
- Window frame / A pillar
- Front panel/Headlight
- Front window
- Road
- Unknown

*The part of which protective performance is demanded by safety standards*

Performance of the protection cap

Evaluation test results

- No-wear: 100%
- Normal cap: 60%
- Abonet + JARI: A 60% reduction
- Helmet: 0%

A 60% reduction in the probability of seriously injury.
5. Conclusion
Conclusion

• In order to perform effective measures, it is important to understand the actual accident condition in each area

• Measures based on the features of each area are important

• Having an accident database in each area and using it widely is also important
How can JARI work with you?

• JARI can give technical support towards accident database construction in each area
  - Training seminar on traffic accident reconstruction