Side Impact Inflatable Restraint Systems

Real World Experience of Side Impact Air Bags in the Special Crash Investigations

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Case Selection Criteria

- High injury outcome with deployment of a side air bag
- Allegations of a fatal or seriously injured occupant attributed to the deployment of a side air bag
- Deployment of a side air bag into a position occupied by a child.
- Deployment of a head occupant protection system into an occupied position.
Various Types of Side Air Bags

IC

Door/ITS

Seat

Seat H/T

Door
## 55 Side Air Bag Cases (10/1/01)

<table>
<thead>
<tr>
<th>Type of Side</th>
<th>Air Bag</th>
<th>Plane of Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Left</td>
</tr>
<tr>
<td>Seat</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>Seat/IC</td>
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<td></td>
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<tr>
<td>Seat H/T</td>
<td>3</td>
<td></td>
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<tr>
<td>Door</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Door/ITS</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Door/IC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>31</td>
<td>5</td>
</tr>
</tbody>
</table>
55 Side Air Bag Cases (10/1/01)

11 - BMW
9 - Mercedes Benz
6 – Volkswagen
2 - Nissan/Infinity
1 – Mazda
1 – Lincoln

9 – Volvo
7 - General Motors
6- Toyota/Lexus
1 – Porsche
1 – Jaguar
1 - Honda
31 Left Side Impacts

- 8 - Head and thorax side air bag deployments
  - 1- Fatal (severe intrusion) struck in driver’s door by school bus
    - Lacerated Aorta and No Head Injury
  - 1- Serious Injury (severe intrusion) struck in driver’s door by a pick up truck
    - Fractured Ribs, Collapsed Lung, Lacerated Spleen, Torn Diaphragm, Torn Bladder and No Head Injury
  - 3- Minor
  - 3- To be determined (new cases)
31 Left Side Impacts

23 - Thorax only side air bag deployments

- 5 - Fatal (severe intrusion)
- 1 - AIS – 3 (To be discussed later)
  - 3 fractured ribs with pneumothorax related to the side air bag deployment
- 1 - AIS - 2 (Struck by P/U, crushing Injury)
  - Concussion; Fractured left clavicle; Contusions to left side of body, related to left side door panel.
- 12 - AIS - 1
- 4 – No injury, a complaint of pain or unknown if injured
12 Right Side Impacts

- 12 - Thorax only side air bag deployments
  - 3 - Fatal (severe intrusion)
  - 3 - AIS - 2 (not side air bag related)
    - Fractured R Wrist, Rib R Contusion, Elbow R Dislocation
    - Fractured Clavicle
    - Fractured Lumbar Vertebrae
  - 2 - AIS - 1
  - 1 – No injury, a complaint of pain or unknown if injured
  - 3 - Not Occupied
13 Fatalities in Side Air Bag Investigations

8 - Driver Fatalities
- 5 Left side impacts with a thorax deployment
  - severe intrusion
- 1 Left side impacts with a Head and Thorax deployment
  - severe intrusion
- 2 Rollover (driver ejection) with a deployment

5 - Passenger Fatalities
- 3 Right side impacts with a deployment
  - severe intrusion
- 1 Rollover
- 1 Frontal
2 Children in Side Air Bag Deployments

- Right front side air bag deployment, 3 year old male, unbelted, minor injury (AIS-1), injury source was the side airbag cover flap.

- Left side, back seat deployment, 13 year old male, unbelted minor injury (AIS-1), injury source side airbag cover flap.
1-Serious Injury Related to a Side Air Bag Deployment

- Vehicle Damage
  - 09LPEW3
  - 11.4” (29 cm) of Maximum Crush
  - 9 MPH (14.5 KMPH) Barrier Equivalent Ä V

- Driver Demographics
  - 76 y/o male
  - 6’2” 180 lbs
  - 3 point manual restraint in use
1-Serious Injury Related to a Side Air Bag Deployment

- **Driver Injuries**
  - Closed fracture 6, 7 & 8th left lateral ribs (3) with left anterior pneumothorax
  - Abrasion left lateral chest

Exemplar Vehicle & Occupant

National Center for Statistics and Analysis
Side Air Bag as the Driver Injury Source

- **Closed fracture 6, 7 & 8th left lateral ribs (3) with left anterior pneumothorax**
  - Resulted from a narrow focused impact
  - Located proximal to the side air bag

- **Abrasions left lateral chest**
  - Crushing injuries related to intrusion are typically contusions
  - Swiping injuries are abrasions
Seat Mounted Thorax
Side Air Bag Issues – 26 Cases

- The fore and aft seat location is not affected.
- Inadvertent deployments.
  - Objects against the seat mounted firing trigger.
- The air bag has produced minor (AIS-1) injuries
- The occupant may “miss the air bag” in crashes with a PDOF of one o’clock.
- No head protection
Door Mounted Thorax
Side Air Bag Issues – 18 Cases

- The fore and aft seat location is affected.
- Inadvertent deployments.
  - GM Recall on Cadillac
- The cover flap has produced one case with serious (AIS-3) injuries
  - Vehicle no longer in production with this air bag configuration
- The occupant may “miss the air bag” in crashes with a PDOF of one o’clock.
- No head protection
- The fore and aft seat location is not affected.
- In the cases with head protection, including at least one fatality due to a thorax injury, the occupant received no life threatening head injuries.
- The head protection side air bag has not been attributed to any injuries.
No fatalities have been attributed to the deployment of a side air bag.

One seriously injured occupant (AIS-3) has been attributed to the deployment of a door mounted side air bag.

In the 2 cases involving children, the side air bags afforded occupant protection.

The head protection side air bag has been successful in reducing head injury.

Passenger compartment intrusion is the primary contributor to the fatal injury mechanism.
Public Access to Data

National Center for Statistics and Analysis

- Internet accessible through Web site