



PSI-03-06



Incremental Benefits Perpendicular to Oblique Configuration

**3rd Pole Side Impact Meeting
Washington, DC
June 9, 2011**

**Presented by
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Benefits Approach

- **NHTSA estimated benefits for a vehicle fleet with 0% side airbag to a fleet with 100% side airbag.**
- **Adjusted for**
 - **Full compliance with FMVSS 201 upper interior requirements**
 - **100% ESC penetration**
 - **Manufacturer's planned airbag sales in MY 2011**
 - **Compliance with requirements in the Final Rule (current FMVSS 214)**
 - **Possible Countermeasures**



Benefits of the Final Rule by Countermeasure

	Combination Air Bag 2 Sensors	Curtain & Thorax Bags 2 Sensors	Curtain & Thorax Bags 4 sensors
Fatalities	266	311	311
AIS 3-5 Injuries	352	361	371

- **For Curtain Bags & 4 sensors**
 - **271 lives saved are from occupants in near side seating position**
 - **40 lives saved from far-side seating positions**
 - **75% lives saved are represented by the 50% male**
 - **Near-side (203), far-side (30)**
 - **25% lives saved from 5th female**
 - **Near side (68), far-side (10)**



Combination Head – Thorax Bag

- **Estimated how many crashes occur obliquely versus perpendicularly**
 - **Perpendicular crashes represented by 3 and 9 o'clock**
 - **Oblique test provides benefits at 2, 3, 9, and 10 o'clock**
 - **Assume an airbag minimally designed to meet the perpendicular test will need to be wider for an oblique test**
 - **According to 2000-2004 crash data, 39% of crashes considered were from 3 and 9 o'clock and the remaining 61% were from the 2 and 10 o'clock directions**



Incremental Benefits by Test Feature

	Combination Air Bag 2 Sensors
Fatalities	
Perpendicular Angle	105
Oblique Angle (wider air bags & possibly more sensors)	162
Total Benefits for the Proposal	266
AIS 3-5 Injuries	
Perpendicular Angle	139
Oblique Angle (wider air bags & possibly more sensors)	214
Total Benefits for the Proposal	352



Window Curtains

- Window curtains produced are wider than what is needed just for the perpendicular test
- Estimate coverage
 - 80% passing rate of current head air bags tested with ES-2re
 - When all body regions are considered, 50th has a 82% passing rate and the 5th has a 48% passing rate
 - The 5th passing rate is 60% of the 50th
 - Therefore – curtain air bags would be 60% effective for occupants represented by a 5th percentile dummy when compared to 50th occupants
 - Thus – Percentage = (passing rate, min) x [(100% of occupants represented by 50th dummy) + (60% of occupants represented by 5th dummy)] $(80\%) \times [75\% + (0.6)(25\%)] = 72\%$



Incremental Benefits by Test Feature

	Combination Air Bag 2 Sensors	Curtain & Thorax Bags 2 Sensors	Curtain & Thorax Bags 4 sensors
Fatalities			
Perpendicular Angle	105	224	224
Oblique Angle (wider air bags & possibly more sensors)	162	87	87
Total Benefits for the Proposal	266	311	311
AIS 3-5 Injuries			
Perpendicular Angle	139	260	267
Oblique Angle (wider air bags & possibly more sensors)	214	101	104
Total Benefits for the Proposal	352	361	371



Thank You

- **Approach described in Pages IX-1 to IX4 of Final Regulatory Impact Analysis**
(Informal Document RD-02)
- ***In response to questions at the June 9, 2011 meeting***
 - ***The target population is 2,042 fatalities and 5,443 MAIS 3+ injuries. The target population includes fatalities & injuries from both the vehicle-to-pole and vehicle-to-vehicle crash modes. The Pole Test countermeasures (i.e. head protection) benefit occupants in both crash modes.***

