Occupant Restraint Systems

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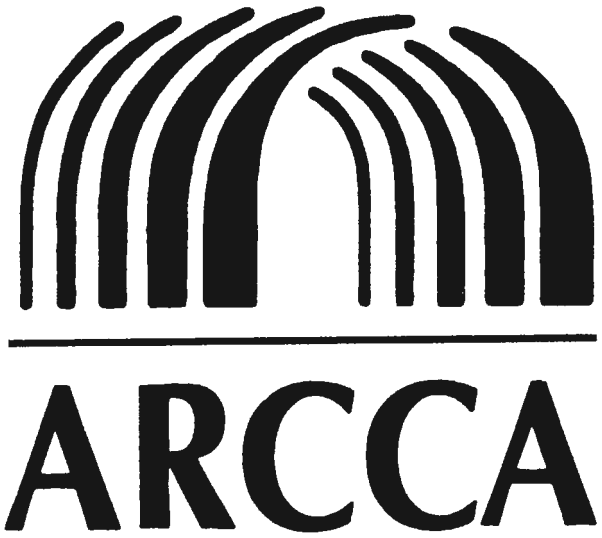

Definitions

- "First" collision:
  - Impact between vehicle and object
- "Second" collision:
  - Impact between occupant and interior of vehicle
- "Ride down":
  - Coupling of the occupant to the vehicle to control crash forces

Causes of Injuries in Crashes

- Impact between occupant and interior of vehicle ("second" collision)

- Ejection of occupant from vehicle

Role of Seat Belts

1 - Prevent ejection of occupant from vehicle

2 - Allow occupant to “ride down” the crash

3 - Prevent “second” collision

Effectiveness of Seat Belts

- **"The chances of being killed or seriously injured in a crash are increased approximately 40-fold by being ejected."**

Preliminary findings from the "NATIONAL CRASH SEVERITY STUDY", National Highway Traffic Safety Administration, DOT HS-804-188, April 1979

Effectiveness of Seat Belts

- **Use of a lap/shoulder belt will provide an approximately 59% reduction in the chance of moderate and greater injury in frontal crashes**

"EFFECTIVENESS OF OCCUPANT PROTECTION SYSTEMS AND THEIR USE", National Highway Traffic Safety Administration, Second Report to Congress, February 1996

Crash Forces

- **In a typical 30 to 35 mph car-to-car frontal crash, occupants will experience forces 25 to 30 times their own weight:**
  - **A 150 pound person will produce about 3,750 to 4,500 pounds of force**
  - **A 10 pound child will produce about 250 to 300 pounds of force**

Dynamics of a Frontal Crash

WITHOUT THE BELT **WITH THE BELT**

0.000 seconds

0.050 seconds

0.100 to 0.120 seconds