Informal document No. **WP.29-144-27**
(144th WP.29, 11-14 March 2008,
Agenda item 6.)

# NHTSA
# Motorcoach Crash Test

# Objective

- Obtain crash pulse from severe frontal crash event
- Obtain dummy readings for
  - Different dummy sizes
  - Different seat types
    - No belts
    - Lap and shoulder belts (3 – point belts)
    - Lap belts (2 – point belts)
    - Different seat manufacturers
- Study seat and seat attachment strength for different dummy sizes and rear occupant loading
- The test was conducted at the Vehicle Research and Test Center in December 2007.

# Motorcoach Details

- 2000 MCI 102EL3 Renaissance
- Series 60 diesel engine
- B500 Allison Automatic transmission
- 54 seats
- 45 ft long, 12 ft 6 inches tall


# Seats on the Motorcoach

- Baseline seats
  - No belts
  - American Seating
- Seats with Belts
  - MCI/Amaya
    - 3 point belts – 4 rows (dual seats)
    - 2 point belts – 1 row (dual seats)
  - Freedman Seating
    - 3 point belts – 1 row (dual seats)

# Seats (Continued)

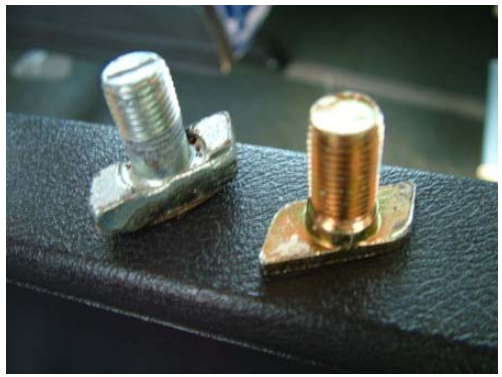
- Baseline (No belts)

- MCI/Amaya/FAINSA
  - 3 – point
  - 2 – point

- Freedman 3 – point

# Seat Attachments

- 9 occupied, 13 unoccupied rows using OEM equipment



- 2 occupied rows reinforced

# Test Conditions

- Speed: 30 mph (48.3 kph)
- Frontal impact: 0 degrees; full overlap
- Fixed Rigid Barrier
- Data channels: 355 dummy; 26 vehicle channels @ 12500 samples/sec

# Occupants

- Hybrid III 50th percentile male – 17 dummies
  - 175 cm (5 ft 9 in) tall and 77 kg (170 lb)
- Hybrid III 5th percentile female – 3 dummies
  - 150 cm (5 ft) tall and 50 kg (110 lb)
- Hybrid III 95th percentile male** – 2 dummies
  - 188 cm (6 ft 2 in) and 100 kg (220 lb)
- Each dummy has
  - Accelerometers in head and chest
  - Load cells in upper neck and femur
  - Chest displacement potentiometer

** The 95th percentile male dummy is not in FMVSS

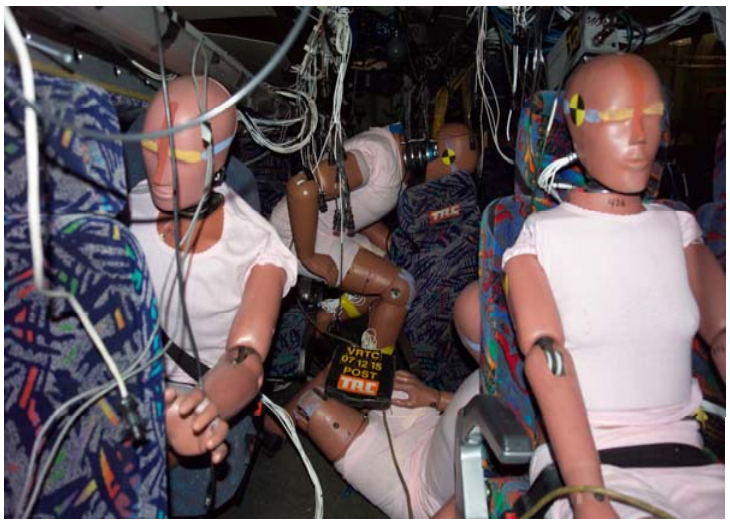
# Post Test Pictures

# Observation - Restraints

- Unbelted dummies:
  - High head accelerations
- Dummies with 2-pt belts:
  - High head accelerations
- Dummies with 3-pt belts:
  - Low head and neck accelerations
- All dummies have low chest accelerations and chest displacements and femur loads

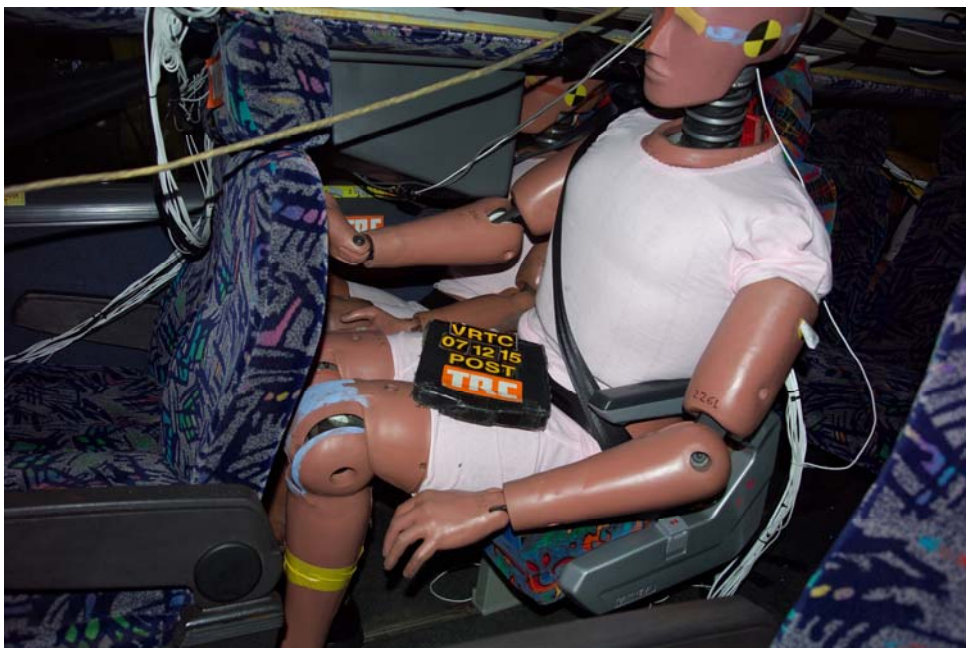
# Observation- Unbelted Dummies

- **Unbelted dummies typically made head contact with the backseat in front within 150-180 ms**
- **Dummies on the aisle seats ended up on the floor and dummies on the window seats ended up on the front seats or on the floor**




# Observation – Belted Dummies

- Dummies stayed in seats
- Head/Knee contact with front backseat for 95$^{th}$ male dummies



# Future Plans

- Conduct roof crush, flammability and evacuation tests
- Evaluate the data for rulemaking recommendations
- Complete information can be found at the www.regulations.gov; docket # NHTSA-2007-28793

# Observation – Seat Hardware

- All seat attachments including baseline stayed intact
- Baseline seats and Freeman seatback broke/bent when impacted by unbelted dummies from behind