

# Changing the Auto Glass Safety Paradigm.

**New Technology, Systems and  
Regulatory Initiatives**

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# Auto Glass Safety Paradigm

- Laminated glass has been used for windshields for 62 years.
  - Still serving as an excellent protection device for occupants and reaction surface for frontal airbags.
- Tempered glass side windows were established as the best available technology nearly 30 years ago.
  - Laminated glass was replaced for cost, durability, weight and safety.

# Auto Glass Safety Paradigm

- Tempered glass side windows
  - Tempered glass was thinner and could be shaped into the designs car makers wanted.
  - Tempered glass shattered into small pieces when broken, which was better for safety than very thick laminates.
  - Tempered glass reduced weight by nearly 50% from the very thick laminates.
  - Durability improved as laminated glass with metal edges was eliminated.

# Auto Glass Safety Issues

- Many safety issues remain with today's auto glass paradigm:
  - Side and back window occupant ejection deaths and injuries.
  - Side and back window partial ejection injuries.
  - No reaction surface for side or roof airbags once the tempered glass has broken.
  - Laceration injuries from flying tempered glass.
  - Vehicle security is an \$8.5 Billion cost in the U.S. for theft of vehicles and contents. (FBI Statistics)

# Laminated Sidelite Break-in



02/05/2001

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# Auto Glass Safety Reality

- Laminated glass has been used for windshields for 62 years.
  - Windscreen performance continues to improve:
    - Durability of the plastics exceed OEM requirements.
    - Solar performance of these laminates for UV and IR continue to improve.
    - Safety performance continues to be excellent:
      - Occupant protection
      - Reaction surface for frontal airbags
  - Many new features can be included with specialty windshield laminates:
    - Head-up displays, antennas, defrosting, etc.

# Auto Glass Safety Reality

- **Tempered glass side windows now are not the best available technology:**
  - Laminated glass side windows (glass/plastic) are now available in thickness of 4.0mm and greater in any shape to meet design parameters.
  - Variety of plastics and systems offer different performance levels depending on vehicle door frame and attachment design.
  - Laminate durability now meets the OEMs need for side windows.
  - Laminated glass side windows can provide multi-functional glazing.

# Auto Glass Safety Reality

- **Laminated glass side windows (glass/plastic) will become the best available technology for occupant safety.**
  - Laminated glass side windows will help automakers address the following key safety issues:
    - Occupant full or partial ejections.
    - Provide a reaction surface for side or roof airbags.
    - Vehicle security.
    - Reduce flying glass lacerations and airbag puncture potential.
  - Laminated glass side windows will allow automakers to improve fuel economy through:
    - Laminates are lighter than the tempered parts they replace.
    - Laminates can reduce the vehicle solar load, UV & IR, allowing for smaller A/C compressors.

# Auto Glass New Technology

- **Multiple glass companies now have developed the following advances in side window glass laminate (glass/plastic) technology:**
  - Good optics of thin glass in bent pairs to produce visually acceptable laminates.
  - Good heat strengthening of the glass to meet door slam and durability requirements.
  - Lamination technology and capacity to produce OEM quality parts.
  - Maintains rigidity, scratch resistance and durability of the current glass technology.

# Auto Glass New Technology

- **Multiple plastics suppliers have developed the following advances in side-window glass technology:**
  - Multiple systems from single-layer plastic interlayers for use with glass to complex multilayer constructions.
  - Flexible to rigid systems have been developed for performance in different door designs.
  - Specialty performance products ranging from:
    - IR reflectance.
    - Antenna systems.
    - Acoustic interlayers.

# Auto Glass Systems Development

- **Development teams including OEMs, glass companies and plastic interlayer suppliers have been established to:**
  - Understand and improve the performance of automotive side windows laminates to meet the OEMs need for vehicle design:
    - Security, safety, sound and solar performance.
  - Laminated glass side window technology in use in over 1.0MM vehicles worldwide.

# Auto Glass Systems Development

- **Industry groups (glass companies, plastics suppliers, and equipment producers) have been established in the U.S. and Europe to speed development and implementation:**
  - EPGAA – U.S.
  - AAMGA - Europe
- **Initial focus has been on establishing performance standards and industry communication.**

# Auto Glass

## Systems Development

- **Industry groups are beginning to broaden the approach to help systems integration.**
  - AORC - Automotive Occupant Restraints Council
    - Laminated side windows provide reaction surface.
    - Laminated side windows should reduce airbag punctures.
    - Both technologies provide complimentary systems.
  - SAE - Society of Automotive Engineers
    - Establishment of a security testing standard.
    - Z26 already has a laminated glass standard established for safety and durability requirements.

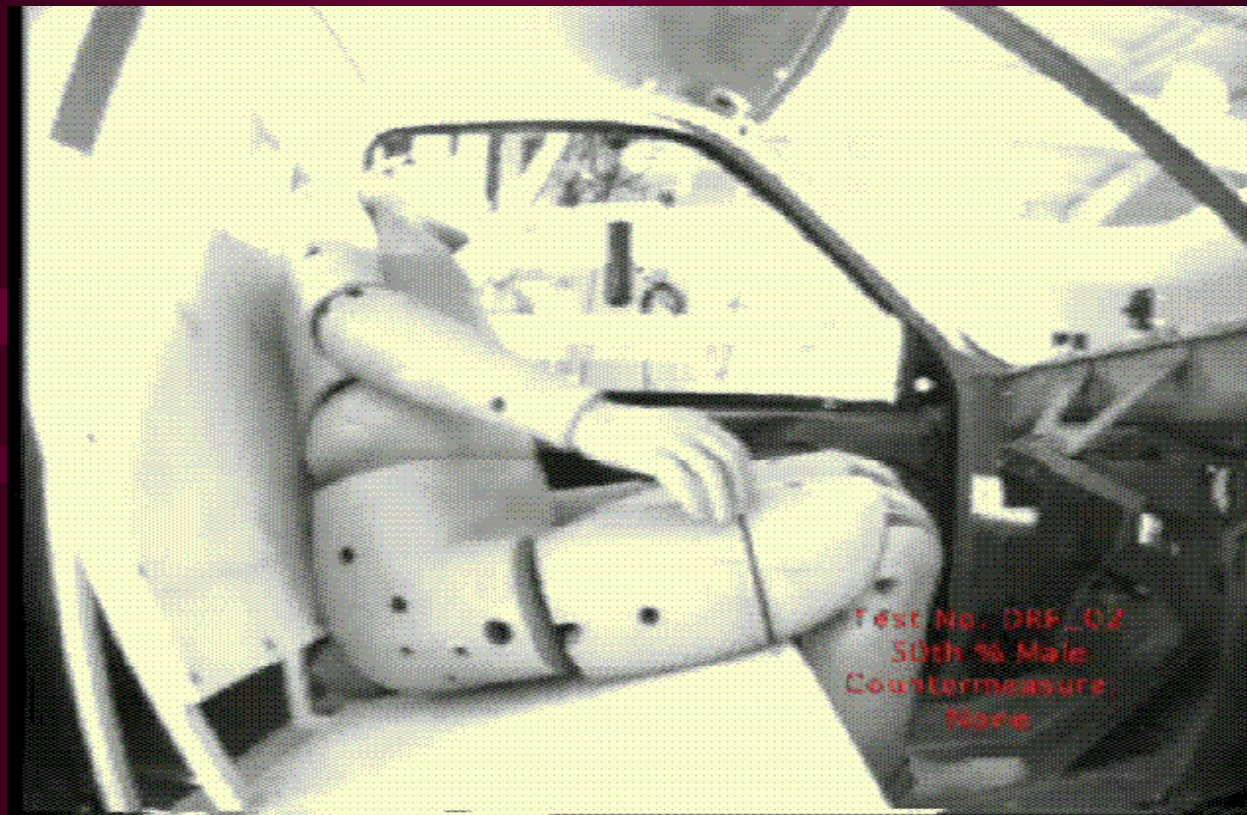
# Auto Glass Systems Testing

- **U.S. Government established a testing program in 1991 for advanced glazing to potentially reduce 8000 annual ejection deaths:**
  - NHTSA has issued two status reports and continues testing of advanced glazing:
    - Findings to date are:
      - Reductions of ejection deaths between 500-1300/year.
      - Multiple glass/plastic systems show enhanced performance.
      - Could aid airbag performance.
      - Limited risks for other issues - HIC or laceration.
    - Continues testing in 2001 for laceration and airbag interaction.

# NHTSA Rollover Simulation

50 % Hybrid III  
Tilted Toward Door  
Countermeasure:  
None

# NHTSA Rollover Simulation



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# NHTSA Test Footage



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# Future Auto Glass Systems

- Auto glass laminates (glass/plastic) will expand it's role into more functional applications:
  - Safety - ejection reduction, laceration reduction and reaction surfaces for airbags.
  - Solar - IR and UV reduction.
  - Sound - noise attenuation.
  - Security - theft reduction.
  - Specialties - head-up displays, defrosting, antennas, styling, etc.