



OUTLINE

1. EXPECTED ENVIRONMENT IN 2025
 2. EMERGING ISSUES
 3. TECHNOLOGIES
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Expected Environment- vehicle size and mass

- CAFE regulation will be phased in by 2025.
- Fleet will consist of lighter mass vehicles, hybrids, plug-in hybrids, all electric and alternate fuel vehicles.
- For same size vehicles can end up with lighter to heavy vehicles.
- Fleet mix will contain nearly 50% of vehicles with today's mass distribution and 50% with reduced mass and/or electrified heavier vehicles.

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Safety Regulations, NCAP's and other Rating tests

- Regulations will not abate but increase worldwide.
- NCAP's will drive vehicle safety and technology content.
- Crashworthiness of vehicles will be enhanced with additional test modes.
- Active safety will play a greater role

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Active versus Passive Safety

- Do not expect an accident free environment.
- Passive safety, i.e. Crashworthiness, has been evolving since the 60's.
- Expect further evolution of passive safety.
- Active safety features will be more affordable due to NCAP and regulatory pressures for advanced technologies.

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See Advancement in Protection Technologies

- Advanced restraints for far-side impacts.
- Ejection mitigation.
- Inflatable belts in rear seats.
- Widespread application of inflatable knee bolsters.
- Possibility of inflatable restraints in front seats, too.
- Vulnerable road users.
- Child protection.

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What is an Inflatable Belt?

- A tubular airbag sandwiched between two pieces of shoulder belt webbing



- In the event of a crash, the airbag inflates across the chest in 30 – 40 ms

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Active Safety Features

- NCAP's will require technology content for highest ratings.
- Advanced technology features will be in affordable vehicles- some standard and some optional.
- Market pull from consumers.
- Vehicle-to-Vehicle communication- who will be first?

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Integration of Active and Passive Safety



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Integrated Safety

- Improvements in sensing technologies and actuators can lead to:
 - Pre-crash deployment of internal restraints
 - Adaptive structures, e.g. external airbags for pedestrian safety and compatibility- self and partner protection
 - Adaptive restraints based on velocity, occupant size and age

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Material Technology

- Substantial utilization of light weight materials:
 - Advanced Ultra High Strength Steels
 - Aluminum
 - Magnesium
 - Composite

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Material Characterization for Predictive CAE

- CAE will play even a greater role in vehicle design.
- Advanced new material characterization- behavior at high strain rates and failure criterion.
- Models of joining, e.g adhesives, welds, rivets, etc..

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Driver Behaviour Modification

- Seat belt interlocks: ongoing research
- Alcohol interlocks
- Adaptive Speed limiters- GPS and roadway environment based
- MyKey- inexperienced drivers, e.g. teen agers

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Safety is a Shared Responsibility

Driver

- Education
- Speed limits
- Safety belt wearing
- Helmet wearing
- Sobriety

Roadway

Infrastructure

- Construction
- Maintenance
- Design for safety
- Rescue Chain

Automobile

Manufacturers

- Pre-crash, crash, post-crash technology
- Facilitate Knowledge transfer
- Best practice guides
- Data sharing
- Research collaboration

See experience sharing in all phases of the continuum of the safety model- knowledge generation, transfer and translation to design

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