VEHICULAR SAFETY ROAD MAP FOR ACHIEVING ROAD SAFETY GOALS

8th IRF Regional Conference
Road Infrastructure for Safe Mobility
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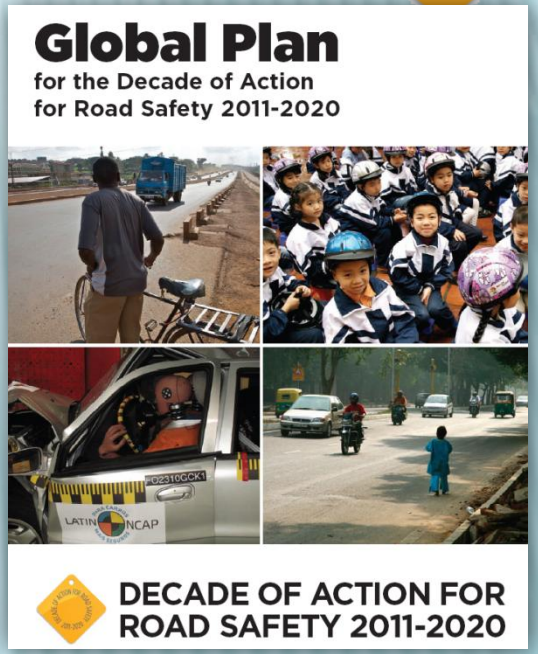
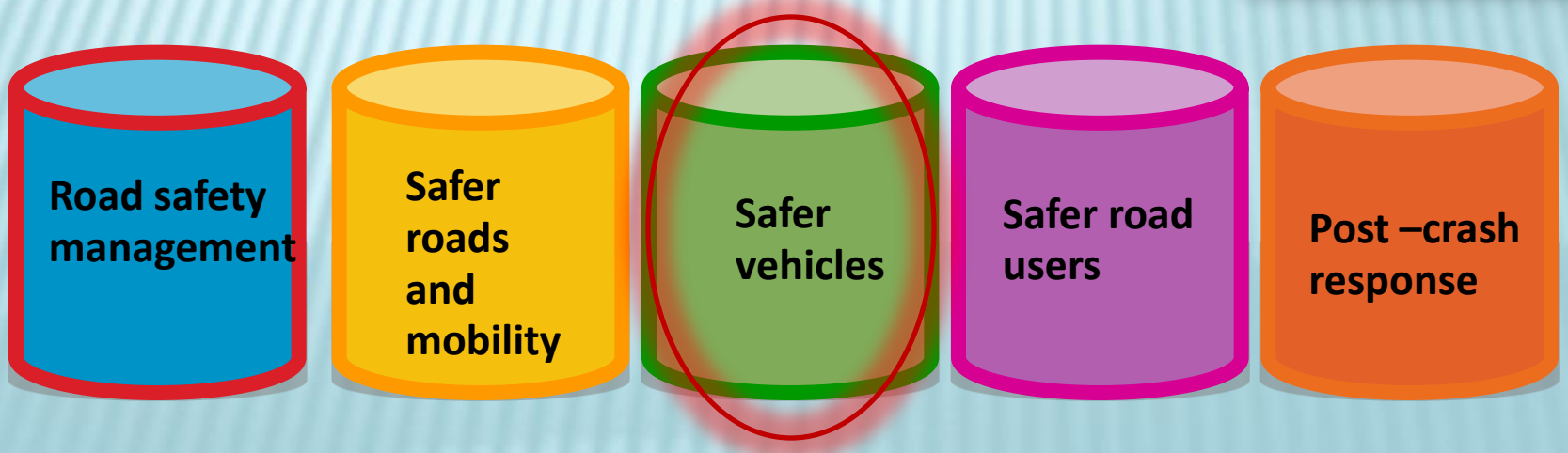
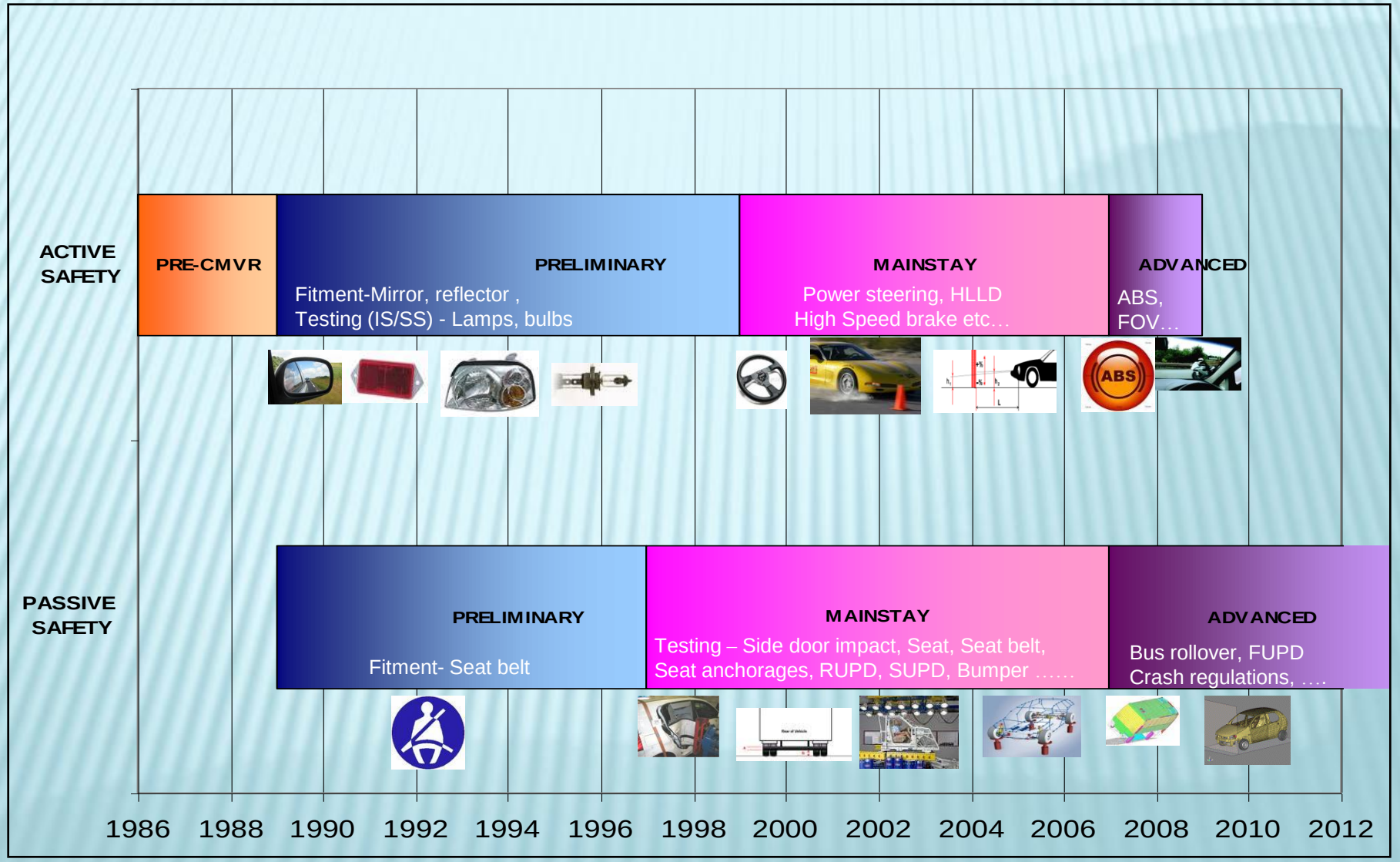
DECADE OF ROAD SAFETY

- United Nations has declared this decade (2011-2020) as DECADE FOR ACTION FOR ROAD SAFETY
- The overall goal of the Decade is to stabilize and then reduce the forecast level of road traffic fatalities around the world by 2020
- Five pillars of United Nations Plan are as follows:





SAFETY REGULATIONS - EVOLUTION



ACTIVE SAFETY REGULATIONS - EVOLUTION

1993

- Mirror Fitment
- Auto Bulb IS1606
- Light Performance
- Reflect reflector fitment

1999

- Reflex Reflector IS 8339

2000

- Power strg. For heavy bus

2003

- Mirror requirement upgrade

2004

- Power strg. For Heavy trucks

2005

- Headlamp leveling device
- Light Performance (ECE alignment)
- Reflex reflector (ECE alignment)
- High Speed braking
- Automotive Bulb (ECE alignment)

2006/2007

- Field of Vision (cars)
- ABS (Select Categories)
- Tyres (AIS044)
- Foot Controls
- Hand Holds

2008/2009

- Conspicuity marking
- Temporary cabin

2015

- Bus Body code
- Truck body code
- Couplings

PASSIVE SAFETY REGULATIONS - EVOLUTION

1993 — Safety belt fitment

1997 — Side door impact

2002 — Safety belt upgrade (ECE Alignment)

2003 — Seat & Seat Anchorages

Rear under run protection device

Side under run Protection device

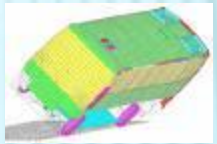
2006/2007 — Bumper for M1

Interior fittings for M1

Seat, seat anchorages For other than M1

2008/2009 — Survival space

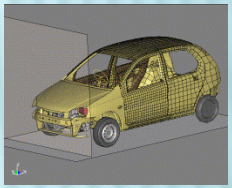
Bus rollover



Front Under run Protection device

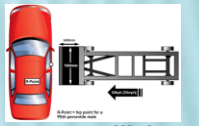
2015/2016 — Child restrain system

Head-on collision

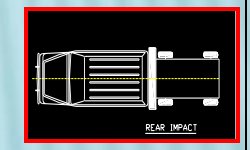


Offset frontal collision

Lateral collision



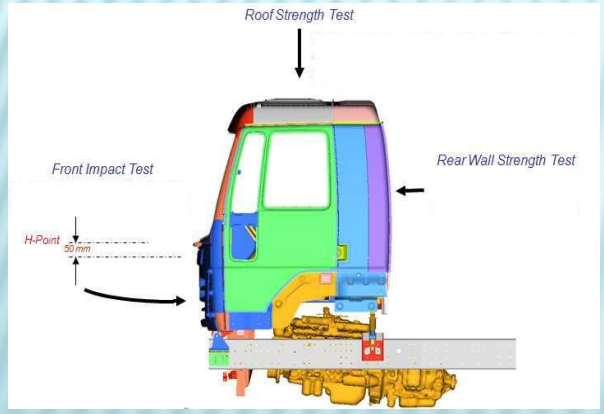
Rear collision



VEHICULAR SAFETY FOR TRUCKS

SURVIVAL SPACE FOR PROTECTION OF CAB

Design and development of a commercial vehicle's cabin should necessarily consider the safety of its occupants. It should be so designed as to eliminate the risk of injury to its occupants to the greatest possible extent in the event of an accident.



- Commercial vehicle safety in India is mainly governed by regulatory requirement – AIS 029
- Only India is the country to implement this stringent regulation

The cab of a truck is subjected to following impacts :

- Frontal impact test (Pendulum impact)
- Roof Strength test
- Rear wall strength test

TRUCK CODE (AIS093)

Standard has been formulated in order to fulfill a compelling and long-felt need to upgrade this segment in the country to enhance its efficiency as well as the safety.
This will also help to improve the design of truck bodies and process controls.

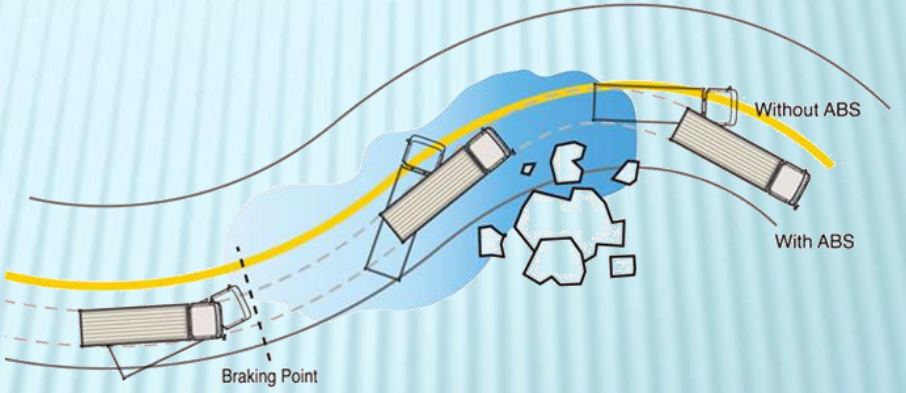
Following critical requirements addressed in the regulation besides other general aspect-

- **Design requirements for Truck Cab**
- **Design requirements for Truck Load Body**
- **Electrical - Lighting and Illumination**
- **Safety requirements for Hazardous Goods Vehicles**
- **Container Mounting, Handling & Securing**
- **Stability of Vehicles meant for the carriage of Hazardous goods etc.**

ANTI-LOCK BRAKING SYSTEM

ABS is an electronic system that monitors and controls wheel speed during braking. The system works with standard air brake systems.

ABS monitors wheel speeds at all times and controls braking during wheel lock situations. The system improves vehicle stability and control by reducing wheel lock during braking

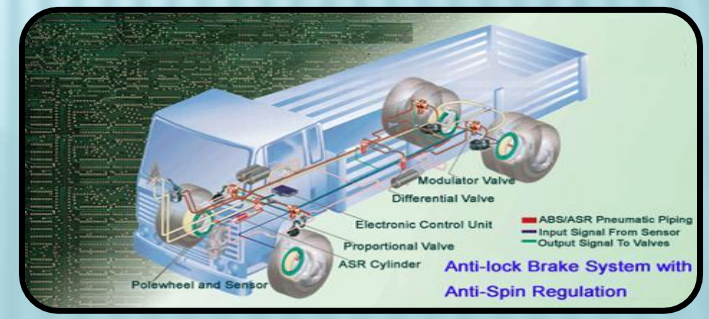


Benefits :

- Enhanced Braking action
- Vehicle Stability
- Vehicle Steer ability
- Stopping distance

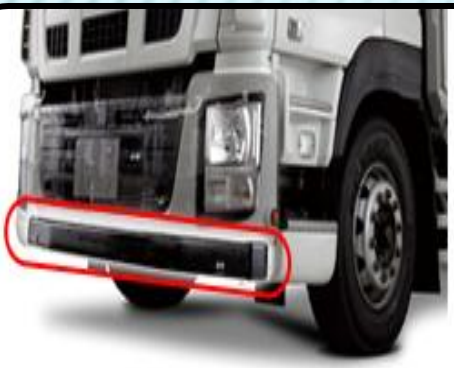
Implemented for following categories :

- Heavy Trucks (Tractor-Trailer) combinations
- Double-deck transport vehicles
- Hazardous & LPG goods carrier vehicles



RUPD, FUPD & SUPD FOR UNDER-RUN SAFETY

- **To avoid small vehicles & pedestrians getting into tyres of Trucks, Underrun safety provisions are made.**



FUPD
(Front Under-run Protection Device)

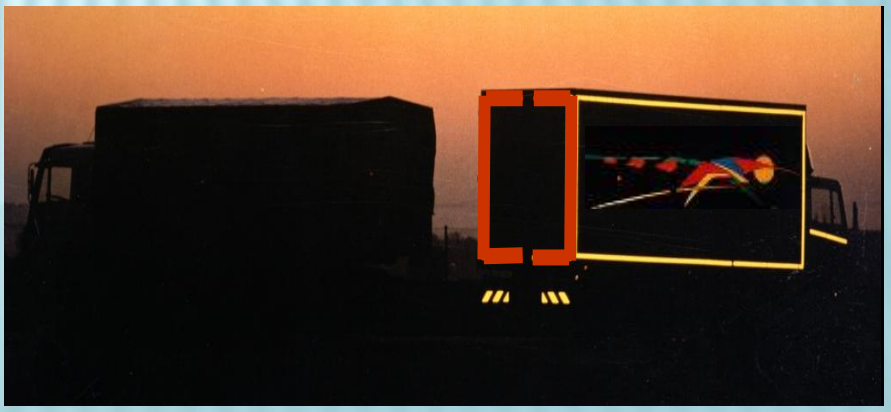
RUPD
(Rear Under-run Protection Device)

SUPD
Side Under-run protection device)

Implemented in India for Heavy Trucks vide AIS (069),IS:14812 & IS:14682

CONSPICUITY MARKINGS -

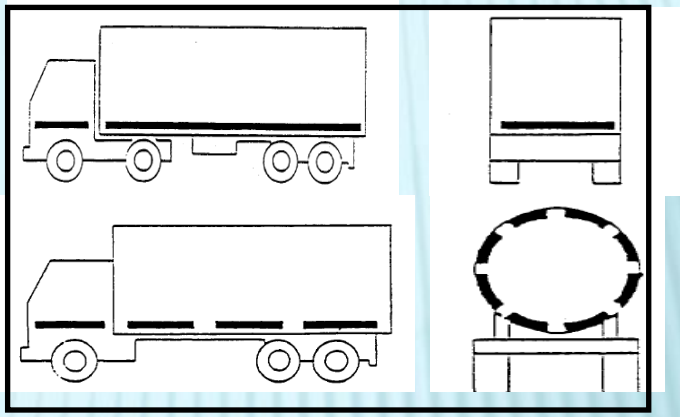
- During daylight hours, drivers identify trucks on the basis of their contour frame.
- Rear lighting systems reflectors alone are typically not sufficient to make trucks conspicuous, or reveal their identifiable shape. These devices get dirty and are often not in working condition.
- The danger posed by speed differences between passenger cars and commercial vehicles is made worse by conditions that engender poor visibility.
- International studies show that presence of reflective tapes result in :-
  - 41% fewer rear end collisions
  - 37 % fewer side collisions



MANDATORY CONSPICUITY MARKINGS (AIS 090)

Colour & Width of Marking

- Side – Yellow - 50mm width
- Rear – Red - 50mm width



Mandatory Requirements

Rear - RED Full contour markings

Vehicles exceeding 2.1m width

Side – Yellow Partial contour markings

Vehicles exceeding 6000 mm length

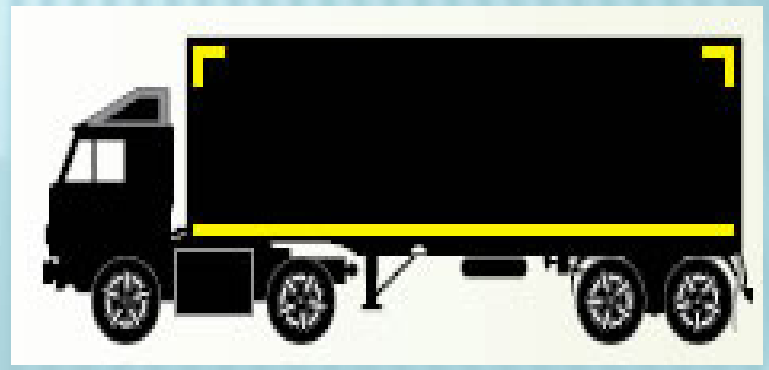
Applicable categories

N2>7.5 ton category

N3 Category

T3 Category

T4 Category



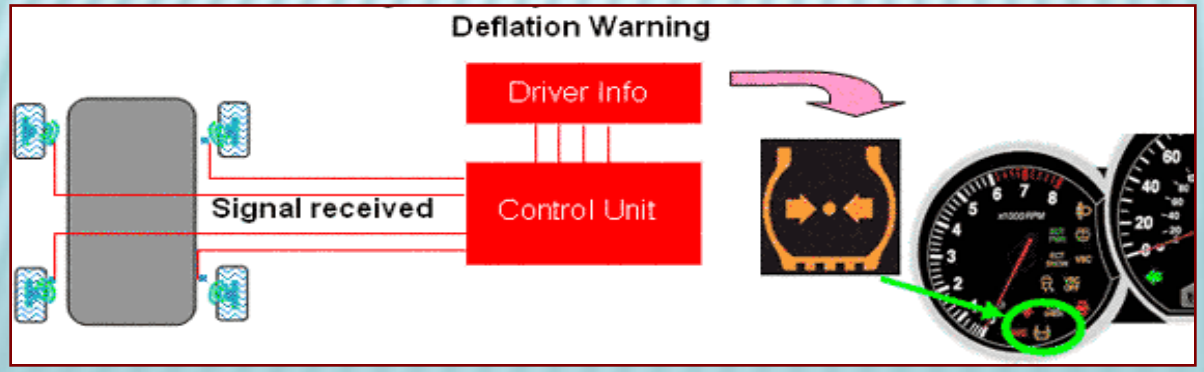
TYRE PRESSURE MONITORING SYSTEM

TPMS :

- Monitor tire pressure and alert driver via display and audible alarms when tire pressures reach varying levels
- Can also monitor temperatures and provide warnings when specified temperature thresholds are reached.

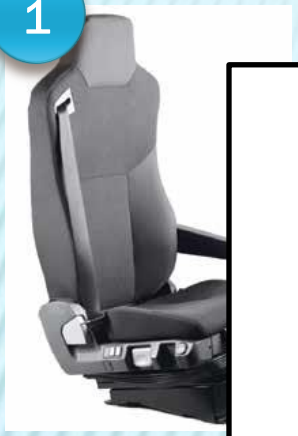
Advantage :

- Temperature monitoring would forewarn driver of any developing fire hazard;
- Allow for safety of passengers by stopping of vehicle to avert hazard.
- Prevents accidents due to tyre bursting.



ADDITIONAL COMFORT FEATURES ENHANCING SAFETY

1 Seats



- Horizontal adjustment
- Height adjustment
- Seat cushion adjustment
- Tilt adjustment
- Heating (optional)
- Backrest adjustment
- Lumbar support (LS)
- Armrest (optional)
- Seat belts

2 HVAC

HVAC unit for Driver & Co-driver comfort

3 Headlamp Leveling

Headlamp leveling switch to adjust the focus of headlamp based on load conditions

4 Crew Seats

Crew seat behind the Driver seat for time off

5 Adjustable Steering & Steering Mounted Controls

Steering mounted controls to operate the vehicle features to avoid distraction of drivers.

VEHICULAR SAFETY FOR BUSES

BUS ROLL-OVER ACCIDENTS :

17 INJURED IN LUXURY BUS ROLLOVER ACCIDENT AT GHANDHINAGAR

Posted by: Vijaysinh Khanna July 9, 2013 in Gandhinagar, Law and Order Comments Off

Gandhinagar (08-Jul-2013) : At least seventeen were injured following a Bus Rollover accident on Monday Early Morning in Gandhinagar.

According to Dabhoda Troopers reports, Bus (RJ 6 AP 1400) rolled-over near Lavarpur Patiya, Gandhinagar – Chiloda Highway on 5:30 AM.

Patrol said 17 Passengers (travelling In Vishvkarma Travels Luxury Bus) were

surrendered after accident. Fatigue driving,

on for the accident.

atrol. The accident blocked traffic for miles at

e clogged was reopened in short time.

India bus rollover kills 5 Americans

NEW DELHI, India (AP) — A bus carrying American college students rolled into a ditch on the way to the Taj Mahal Thursday, killing a University of Pittsburgh faculty member and four students, the U.S. Embassy said.

The Indian bus driver and a tour guide were also killed.

Police said the bus was coming from New Delhi, but earlier reports said it was coming from Varanasi, a Hindu pilgrimage site on the Ganges River.

Four injured students were admitted to a hospital in Agra, 187 miles east of New Delhi, where the 17th century monument to love is located.

United News of India said the bus overturned in the ditch as it was trying to pass another vehicle.

The students were part of a group that had traveled to India earlier this month by ship to the southern city of Madras, an embassy official said, speaking on condition of anonymity.

They apparently were traveling in a private bus.

The students killed were identified as Cherese Laulhere of Long Beach, Calif.; Jenn

Belmer, Calif.; S

Amherst, Mas

Amato of Me

member was

John Wilso

12 INJURED IN BUS ROLLOVER IN BATIYA AT KALYANPUR

Posted by: Editor July 11, 2013 in Devbhoomi Dwarka, Gujarat, Law and Order Comments Off

Batiya, Kalyanpur (10-Jul-2013) : A Bus – Rollover vehicle accident in Batiya, Kalyanpur left twelve injured on Wednesday Morning.

As stated by Khambhaliya Patrol, Bus (GJ 10 TT 5427) rolled-over at Khambhaliya Dwarka Highway, Batadiya Patiya in Morning. Officials said 12 Passengers were rushed to a hospital in stable condition at Referral hospital.

A case has been registered against accused. Accused has surrendered after accident. Over-speeding, going too fast for conditions – is considered reason for the accident.

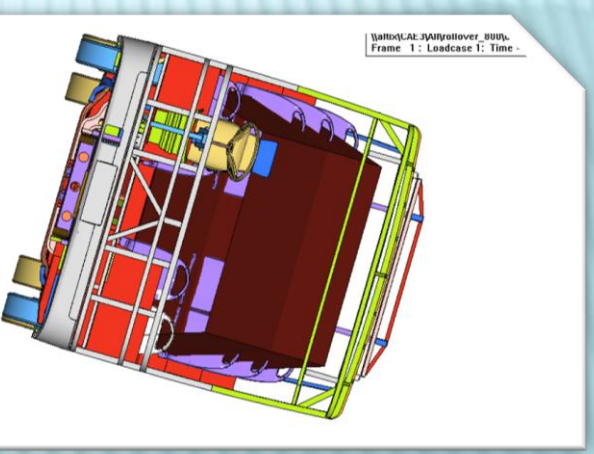
Traffic was bunged on the Khambhaliya Dwarka Highway, Batadiya Patiya after the crash. The slowed was later reopened sooner crews cleared the scene.

ROLL OVER PROTECTION (AIS 031)

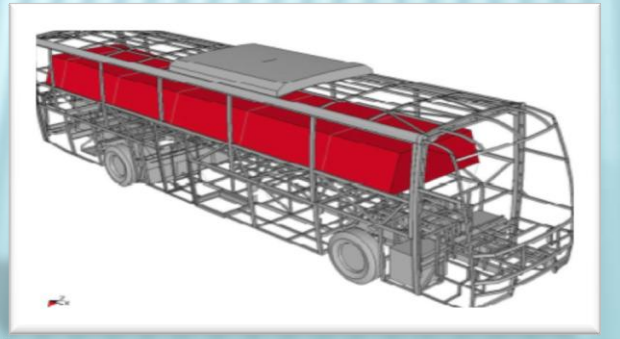
Bus rollover is one of the most serious types of accident as compared to other modes of bus accidents.

Roll Over Protection :

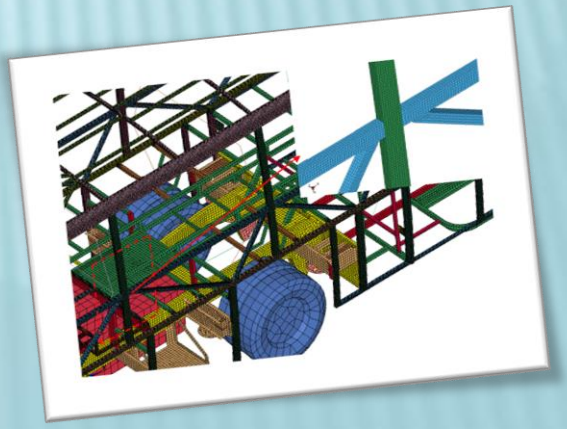
- **Strengthening bus frame to maintain residual space (occupant space).**
- **Minimizing occupant injury.**



Finite Element Model



Residual Space



FIRE ACCIDENTS IN BUSES

Three killed in bus fire in Mulbagal in Kolar district

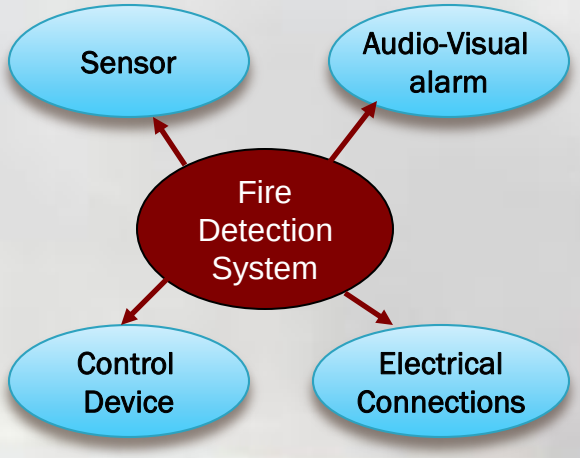
Driver sleeping in bus burned alive

Maharashtra: 15 dead as bus accident sparks fire

FIRE DETECTION SYSTEM

An automatic fire detection system is designed to detect the unwanted presence of fire by monitoring environmental changes associated with combustion .

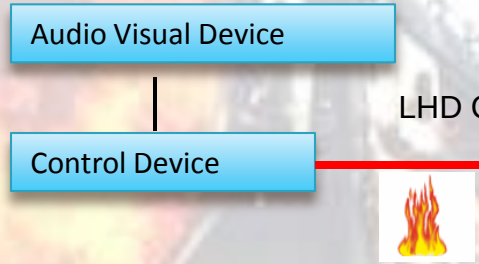
FDS comprises -

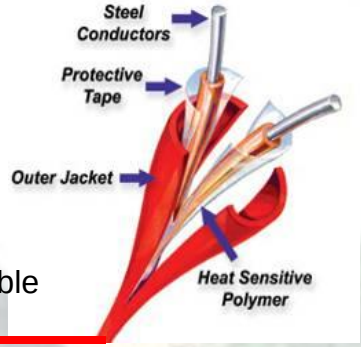


A working principle of Linear Heat Detector (LHD) based system :

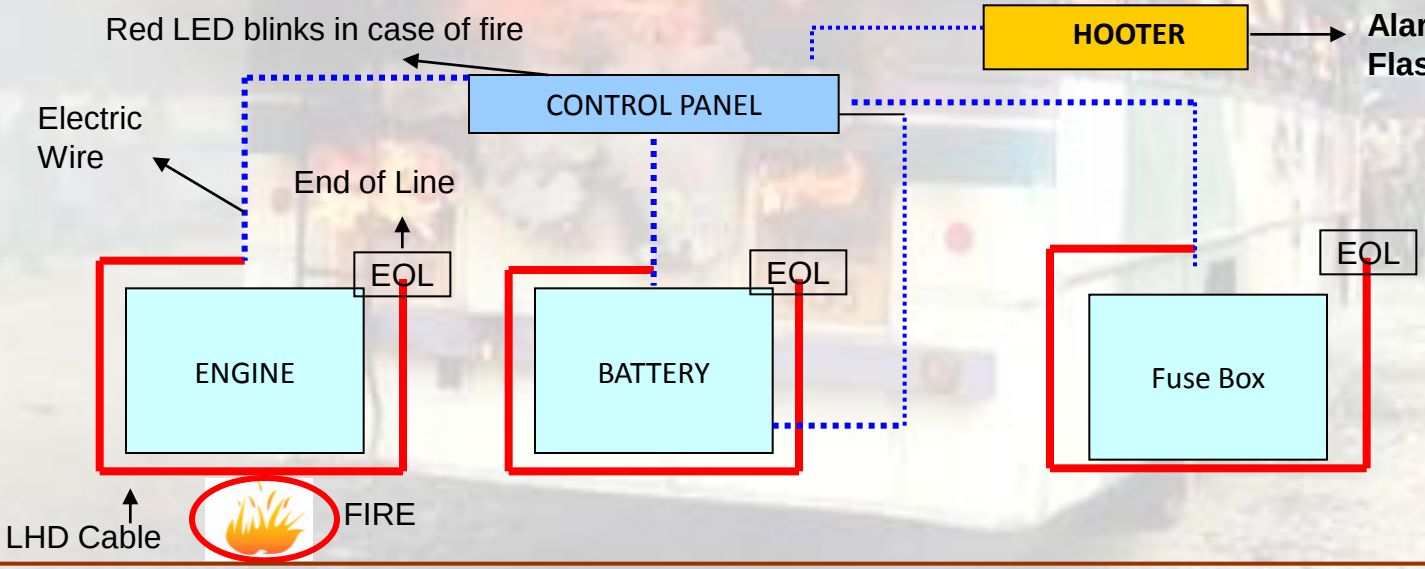
- System senses thermal changes according to rated value
- LHD cables are used as sensors.

Steel conductors come in contact in case of fire & give signal to control panel by completing circuit





LAYOUT



ANTI-LOCK BRAKING SYSTEM FOR BUSES

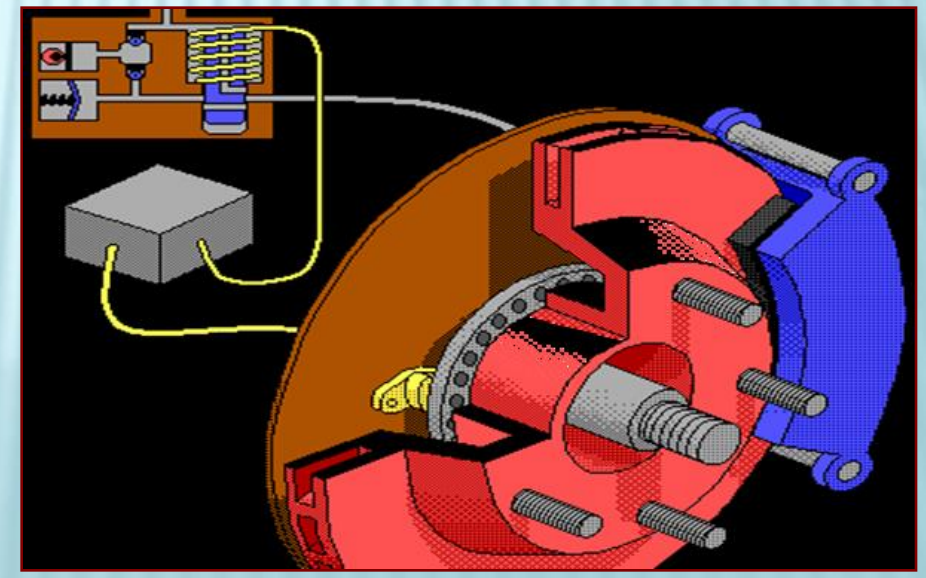
Benefits :

Enhanced Braking Action, Vehicle Stability, Vehicle Steer-ability, Stopping distance

Implementation :

All buses plying in Hilly Region

All India Tourist Permit Buses



ADDITIONAL COMFORT FEATURES

(RESULTING IN BETTER SAFETY FOR DRIVER AND PASSENGERS)

1

Low floor Buses

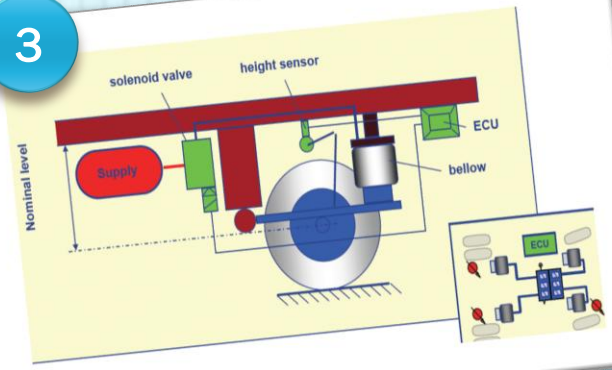
Passengers can board easier, faster and safer

2

Provision for Persons with Disabilities

Ramp for wheel chair user

3



Electronically Controlled Air Suspension

6

Body construction for reduced noise & heat insulation

4

Widest wind shield for clear vision

5

Rear View Camera System

INTELLIGENT TRANSPORT SYSTEM (ITS)

Communication with Back office

GPRS

On board ITS related requirements
ITS Controller, Driver Route Guidance, Ticketing Machine with smart card, Camera, Destination boards, Passenger Information displays.

Camera & Reorder

Ticketing Machine

Communication with Depots

Vehicle Health data

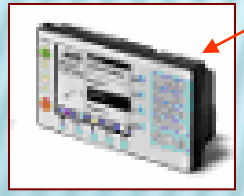
WLAN

Destination Displays

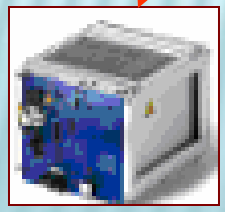
Intelligent Bus

GPRS

Communication with Intelligent Bus Stops



Driver Route Guidance



ITS Controller

Passenger Information Display- inside the bus

THANK YOU!!!