UNIT-V

Various safety systems in automobile vehicles now a day's required to prevent from automotive accident and also injuries occurrence due to this accident.

Active Safety System

Active driving safety refers to devices and systems that help keep a car under control and prevent an accident. These devices are usually automated to help compensate for human error the single biggest cause of car accidents. These systems avoid accidents and hence they function at all times during use of the vehicle.

1. Electronic Stability Control(ESC)
2. Anti-lock Braking Systems(ABS)
3. Electronic brake force distribution(EBD)
4. Traction control system(TCS)
5. Torque Vectoring System
6. Night View Assist (NVA)
7. Tire-pressure monitoring system(TPMS)

Passive Safety System

Passive driving safety refers to systems in the car that protect the driver and passengers from injury if an accident does occur. These systems reduce the level of injury to the occupant and increase their safety in case of accident.

1. Air bag
2. Seat belts
3. Crumple zone(monologue body structure)
4. Side impact beam
5. Collapsible steering column
6. Head restraints
7. Laminated windshield
8. Toughen glass

Electronic Stability Control

Electronic Stability Control (ESC) helps drivers to avoid crashes by reducing the danger of skidding, or losing control as a result of over-steering. ESC becomes active when a driver loses control of their car. It uses computer controlled technology to apply individual brakes and help bring the car safely back on track, without the danger of fish-tailing.

Antilock Braking System

Active braking systems are new safety technologies that provide drivers with brakingSupport during emergency situations.

Anti-lock Braking Systems work

There are many versions of active braking systems, providing differing degrees of braking support. Preliminary systems, such as Brake Assist, measure the speed and force of brake application to determine whether the driver is attempting an emergency stop. If such an emergency is determined, the system applies additional brake pressure to allow the driver to take full advantage of the Antilock Braking System which prevents wheel lock up.

Electronic Brake Force Distribution

Electronic brake force distribution, Electronic brake force limitation is an automobile brake technology that automatically varies the amount of force applied to each of a vehicle's brakes, based on road conditions, speed, loading, etc. Always coupled with anti-lock braking systems, EBD can apply more or less braking pressure to each wheel in order to maximize stopping power whilst maintaining vehicular control. Typically, the front end carries the most weight and EBD distributes less braking pressure to the rear brakes so the rear brakes do not lock up and cause a skid. In some systems, EBD distributes more braking pressure at the rear brakes during initial brake application before the effects of weight transfer become apparent.

EBD works

The job of the EBD as a subsystem of the ABS system is to control the effective adhesion utilization by the rear wheels. The pressure of the rear wheels is approximated to the ideal brake force distribution in a partial braking operation. To do so, the conventional brake design is modified in the direction of rear axle over braking, and the components of the ABS are used.EBD reduces the strain on the hydraulic brake force

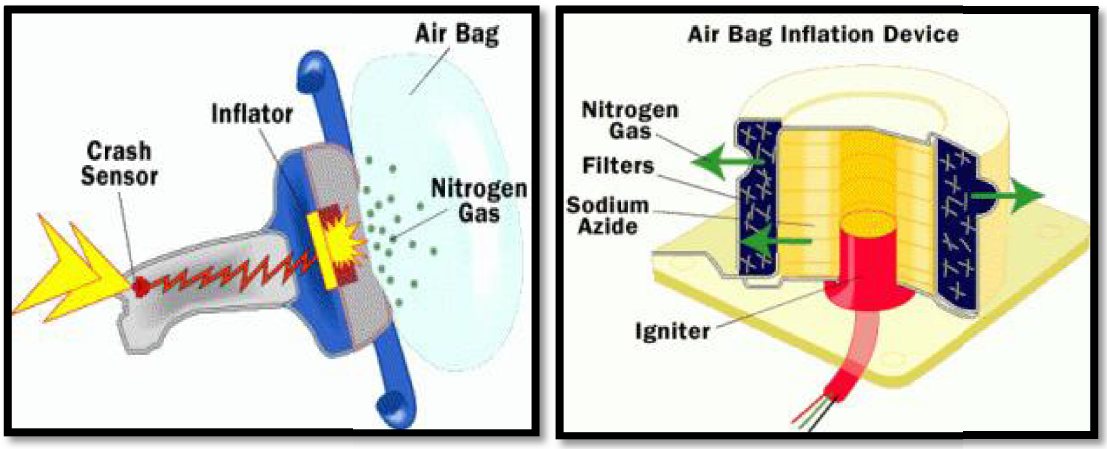
proportioning valve in the vehicle. EBD optimizes the brake design with regard to: adhesion utilization; driving stability; wear; temperature stress; and pedal force.

Air Bag

An airbag is a vehicle safety device. It is an occupant restraint system consisting of a flexible fabric envelope or cushion designed to inflate rapidly during an automobile collision. Modern vehicles may contain multiple airbag modules in various sides and frontal locations of the passenger seating positions, and sensors may deploy one or more airbags in an impact zone at variable rates based on the type, angle and severity of impact; the airbag is designed to only inflate in moderate to severe frontal crashes.

Airbags work

The design is conceptually simple; a central Airbag control unit (ACU) monitors a number of related sensors within the vehicle, including accelerometers, impact sensors, side (door) pressure sensors, wheel speed sensors, gyroscopes, brake pressure sensors, and seat occupancy sensors. The bag itself and its inflation mechanism is concealed within the steering wheel boss (for the driver), or the dashboard (for the front passenger), behind plastic flaps or doors which are designed to "tear open" under the force of the bag inflating. Once the requisite 'threshold' has been reached or exceeded, the airbag control unit will trigger the ignition of a gas generator propellant to rapidly inflate a fabric bag. As the vehicle occupant collides with and squeezes the bag, the gas escapes in a controlled manner through small vent holes. The airbag's volume and the size of the vents in the bag are tailored to each vehicle type, to spread out the deceleration of (and thus force experienced by) the occupant over time and over the occupant's body, compared to a seat belt alone.



Seat Belts

Seatbelt wearing saves over 2,000 lives every year. Everyone knows they should wear aseat belt in the front seat, but many people still don't realize how dangerous it is not to wear aseat belt in the back. In a crash at 30mph, if you are unrestrained, you will hit the front seat,and anyone in it, with a force of between 30 and 60 times your own body weight. This couldresult in death or serious injury to you and people sitting in front of you.

Seatbelt works

Due to the fact that an abrupt stopping force could contribute to a passenger's injury, thematerial of which a seatbelt is constructed from is designed to allow for a small amount ofmovement as the body tries to move forwards. Lengthening the time taken for the body tocome to a stop helps to reduce the impact that the body experiences.Typically, a seatbelt will include a 'retractor mechanism' that causes a spring inside theretractor to apply a rotational force to the spool when it is being pulled. This means that thebelt tightens once it becomes loose to reduce the amount of 'slack' in the material, helping tosecure the passenger to their seat.

Modern seatbelt mechanisms also include a pre-tensioner, which pulls the belt inwardsonce the car comes to an abrupt stop. The pre-tensioner is attached to a chamber ofcombustible gas and a central processor, which can detect a rapid decrease in the car's velocity.Once this is detected, an electrical current is sent across two electrodes, which causes the gasto be ignited. This creates pressure which pushes on a piston in the chamber, causing theseatbelt spool to quickly rotate, winding up any loose material.

Collapsible Steering

For safety reasons all modern cars feature a collapsible steering column (energyabsorbing steering column) which will collapse in the event of a heavy frontal impact to avoidexcessive injuries to the drive. Airbags are also generally fitted as standard. Non-collapsiblesteering columns fitted to older vehicles very often impaled drivers in frontal crashes,particularly when the steering box or rack was mounted in front of the front axle line, at thefront of the crumple zone.

Collapsible steering works

A collapsible steering column is a mechanism that is used to transfer energy fromthe steering wheel into the steering gear box, which transfers energy to turn the wheels of avehicle. Though the designs for steering columns have varied since their inception, a typical collapsible steering column looks like two interlocking shafts that