SAFETY AIRBAGS IN CARS

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INTRODUCTION

- Flexible bag or pillow like structure which inflates and deflates rapidly during certain types of car accidents.

- Can be located both in front and rear of vehicles.

- It is referred as an passive safety device.

- GENERAL MOTOR developed first bag in 1970 and was marketed as air cushion restraint system.
The Basics of Airbags

- Newton’s second law of motion.

- If objects aren’t restrained they will continue moving at the speed of the moving car even if the car is stopped by a collision.

- All airbags need to do is to slow down passengers speed.
MAIN PARTS OF AN AIRBAG

- Bag
- Sensor
- Inflation system
**BAGS**

- It is made up of a thin nylon fabric, which is folded into the steering wheel or dashboard or the seat or door.
- The powdery substance released (regular cornstarch or talcum powder) is used to keep the bags lubricated while they’re in storage.
SENSOR

- A device that tells the bags to inflate.
- It works with the control module to discriminate between crash and non-crash events.
- By function, there are 2 types - impact sensors and safing sensors.
Location of airbag sensor
CONSTRUCTION OF AIR BAGS

Airbags are assemblies consisting of an airbag (made of Nylon), inflator modules and sensor housing, electrical connectors (Clock spring), airbag retainer and the cover.
INFLATION SYSTEM

- $\text{NaN}_3 + \text{KNO}_3 = \text{large amts. of NITROGEN GAS.}$
- Hot Blasts of the nitrogen inflate the air bag from its storage site up to 322 Km/h.
Inflator assembly

- Control module activates airbag assembly
- Electric current is sent to the detonator
- Ignition of sodium azide pallets-evolves nitrogen gas.
Inflator assembly

IGNITER

SODIUM AZIDE

DETONATOR

FILTER SCREEN
WORKING

- Air bags are designed to inflate in frontal impacts in which the car strikes about 16 km/hr
- After collision sensor sends an electric current to igniter system
- Electric current heats the filament which ignites the capsule which in turn ignites the gas generating pallets
- The gas expands quickly and inflation of air bags there by takes place, which break through a plastic cover in the steering wheel
- Time taken for all these things about .1 sec.
Modern types of airbags

- **Curtain airbags**
  - Developed by MERCEDES and VOLVO
  - Inflates in front of windows to provide passengers better head and neck protection
  - More efficient at tipping and side impacts
  - Reduce HIC by 80%

contd.......
- **Head thorax bag**
  - Developed by Ford and Renault
  - High protection to head

- **“ITS” Airbag**
  - Developed by BMW.
  - Worlds first airbag for head protection
SIDE AIRBAGS

Three different types:

- Roof-mounted side airbags designed to protect the head and neck.
- Door-mounted side airbags designed to protect the chest.
- Seat-mounted airbags designed to protect the chest and
DRIVERS SIDE AIRBAG
Air bag deployment

- Airbag inflation
- Depicts contact with airbag
- Coming to rest in seat and deflation of airbag
- All these take in 30 milliseconds
Airbags checks

- When we turn key look at the dash to find airbag light for 7-10 sec. & then comes out

- Problems occur when
  1. light does not come on
  2. if light does not go off after period
  3. if light comes during driving
Disarming airbags

- Disconnect battery
- Wait 30sec.
- Remove airbag fuse
- Drop sound insulator panel
- Disconnect the circuits
- Thus the bag is disarmed
- Keep the bag below 130degree celsius
DEVELOPMENT

- **1973** - The Oldsmobile Toronado became the first car with a passenger airbag;
- **1974** - Buick, Cadillac and Oldsmobile offer dual airbags as an option on several of their full-sized cars
- **1980** - Mercedes-Benz re-introduced the airbag in Germany as an option on its high-end model W126
- **Mid-1980's** - Ford and Chrysler introduce airbags in their vehicles;
- **1990** - Ford makes airbags standard equipment in its vehicles.
- **1990** - The first recorded accident between two vehicles in which an airbag deploys to protect each driver occurs on March 12, 1990

- **1995** - Volvo offers side airbags and torso side protection airbags as an option on its 850 models; **1998** - The federal government mandates duel frontal airbags on all passenger vehicles

- **2006** - Honda introduces the first airbag systems for motorcycles American Honda Motor, Corp.
Future of airbags

- **Smart systems**
  - Includes weight sensors
  - Determine type occupant in seat i.e. child or adult.

- **Infrared occupant**
  - Detect the distance of passenger from airbags

- **Capacitive reflective occupant sensing**
  - Identify distance passenger from dash board
  - Discriminate between human occupant and inanimate objects
- **Update sensor**
  - Deploys seatbelt pretensioners faster to get benefit of airbags

- **Centralized electronic control unit**
  - New sensor technology through software
CONCLUSIONS

- Air bags are of greater importance in today's vehicles since safety of human life is of prior importance.
- Saved life of 1136 people from 1986 to 1995 and 600 alone in 1996.
- Once equipped in all cars it is estimated that 3000 lives will be saved each year.
- So far safe riding and for saving the precious life the safety bags must be implemented.
- Let's hope every automobile manufacturer implements the same.
THANK YOU