SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

COIMBATORE-35.

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.

DEPARTMENT OF AUTOMOBILE ENGINEERING

COURSE NAME : 23AUT101 – ELEMENTS OF AUTOMOTIVE SYSTEM

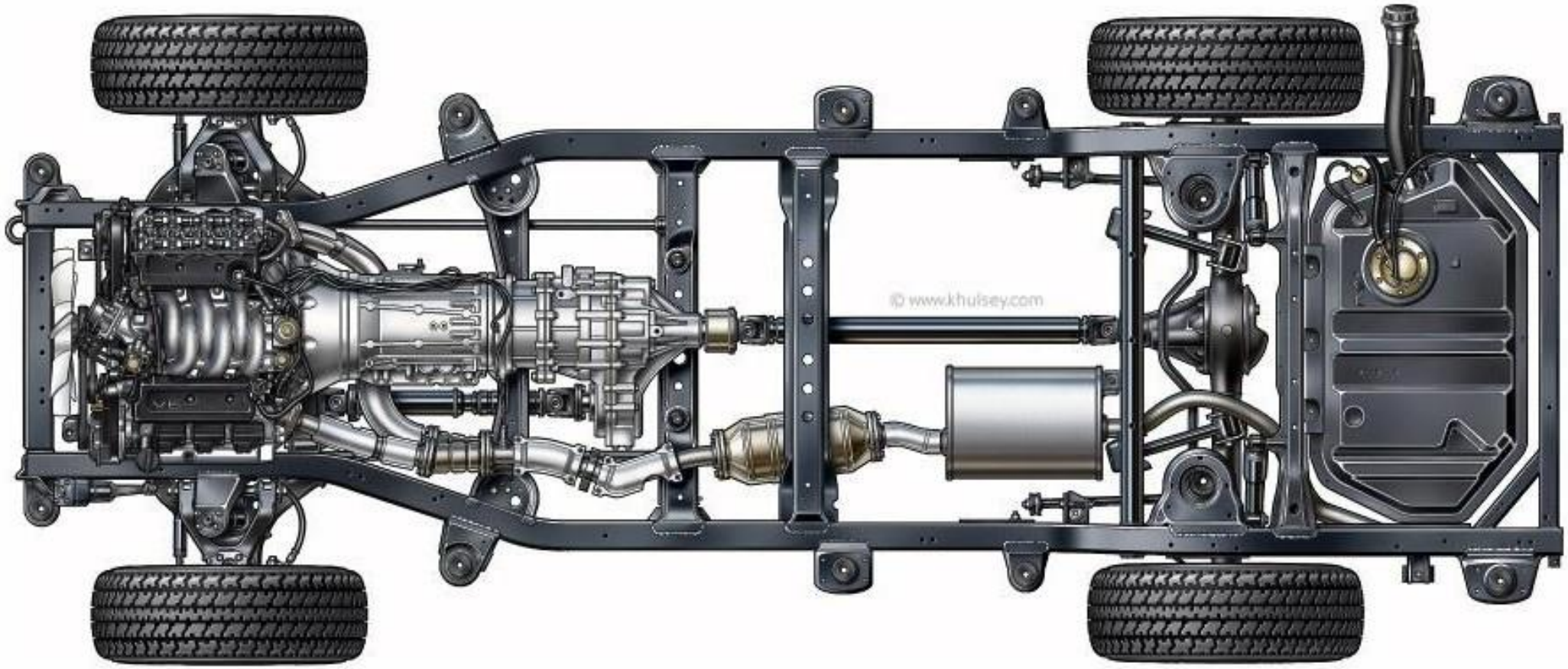
I YEAR /II SEMESTER

Unit 1- VEHICLE STRUCTURE

Topic :Layout of an automobile, Role and requirement of a chassis frame

Chassis

- Chassis is a French term and was initially denote the frame or main structure of a vehicle.
- A vehicle with out body is called Chassis. The components of the vehicle like Power plant, Transmission System, Axles, Wheels and Tires, Suspension, Controlling Systems like Braking, Steering etc., and also electrical system parts are mounted on the Chassis frame. It is the main mounting for all the components including the body. So it is also called as Carrying Unit.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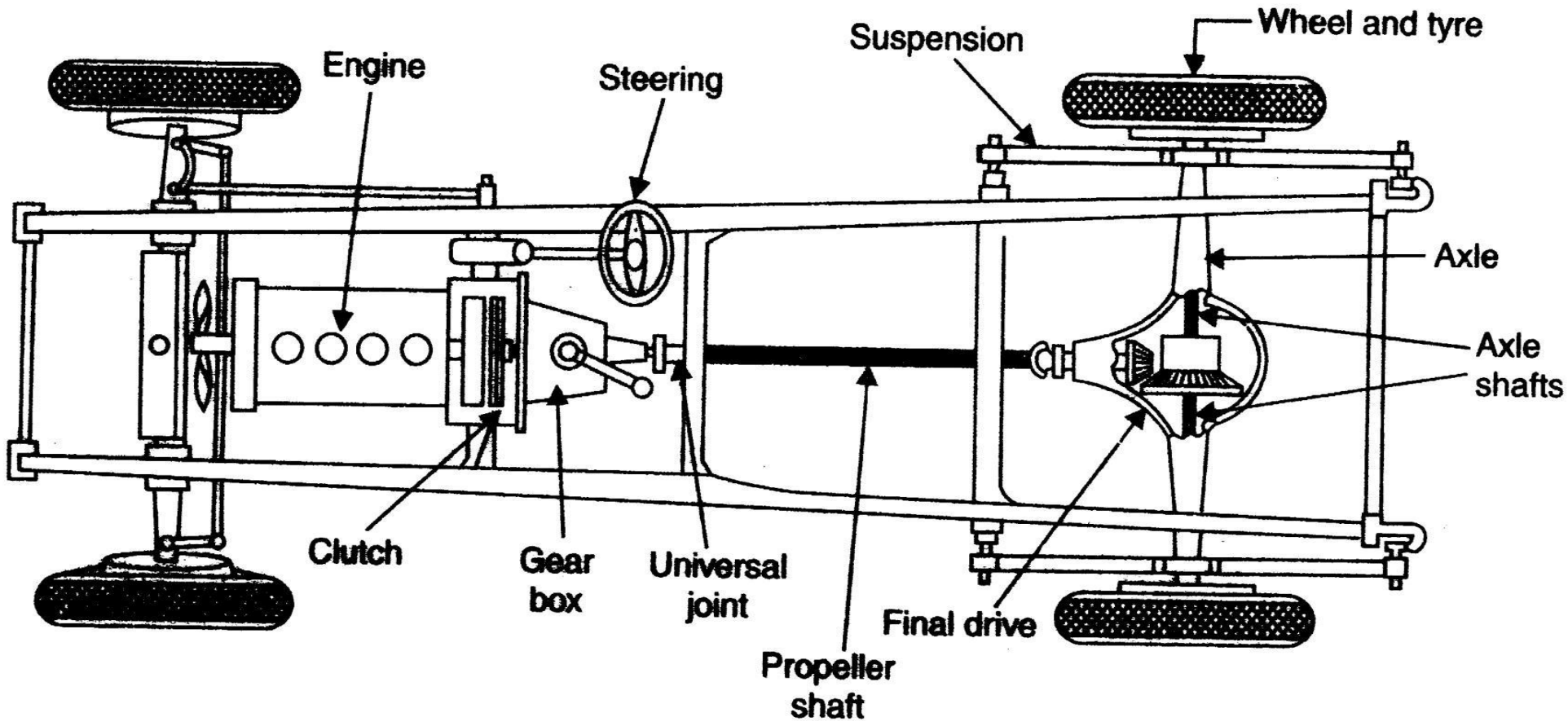
Function

- Support the weight of the vehicle (except the unspring mass) and everything inside it including passengers and cargo.
- Provide the frame for the suspension, engine and drivetrain to be mounted. It must be strong to hold these components in place during various driving conditions.
- Handles or resists any torsional stress (such as bending or twisting of the body) that the vehicle may be subjected to as it drives.
- It allows the vehicle to pull objects as these heavy objects must be directly or indirectly attached to the chassis.


Engine
Steering
Suspension
Wheel and tyre
Axle
Axle shafts
Clutch
Gear box
Universal joint
Propeller shaft
Final drive

Classification of Chassis

According to Control

- Conventional Chassis

  Engine is fitted in front of the driver cabin
- Semi Forward Chassis

  Half portion of the engine in the drive cabin Ex: Standard,

  Pick-ups
- Full Forward Chassis

  Full engine is mounted in the driver cabin

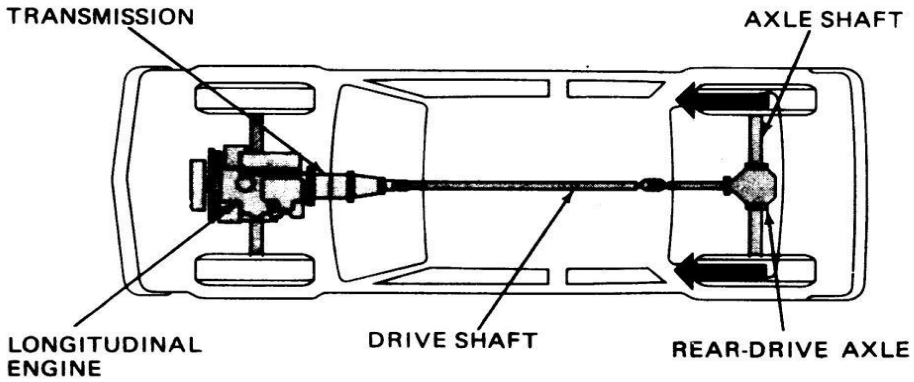
Conventional Vehicle

Semi Forward Vehicle

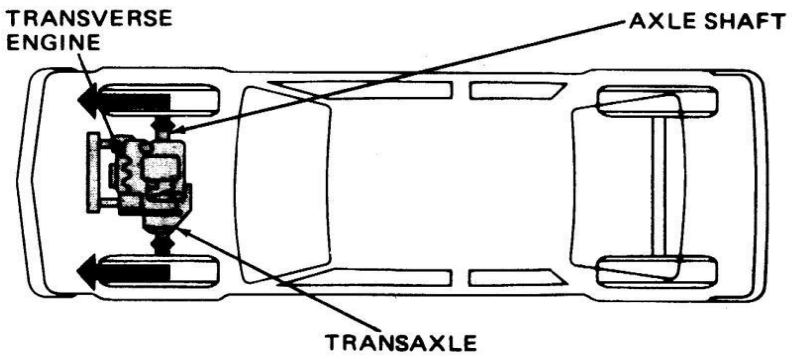
Full Forward Vehicle

According to Fitting of Engine

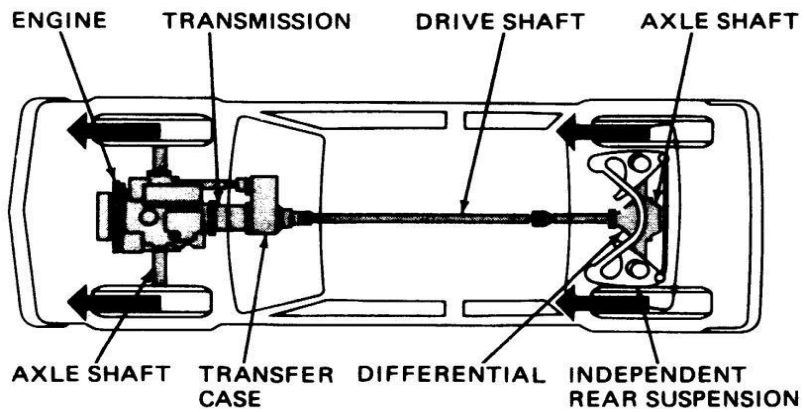
- Engine at Front
- Engine at Front but Cross wise
- Engine fitted at the centre of the chassis
- Engine fitted at the back



(A) REAR-WHEEL DRIVE



(B) FRONT-WHEEL DRIVE



(C) ALL-WHEEL/FOUR-WHEEL DRIVE

Frame

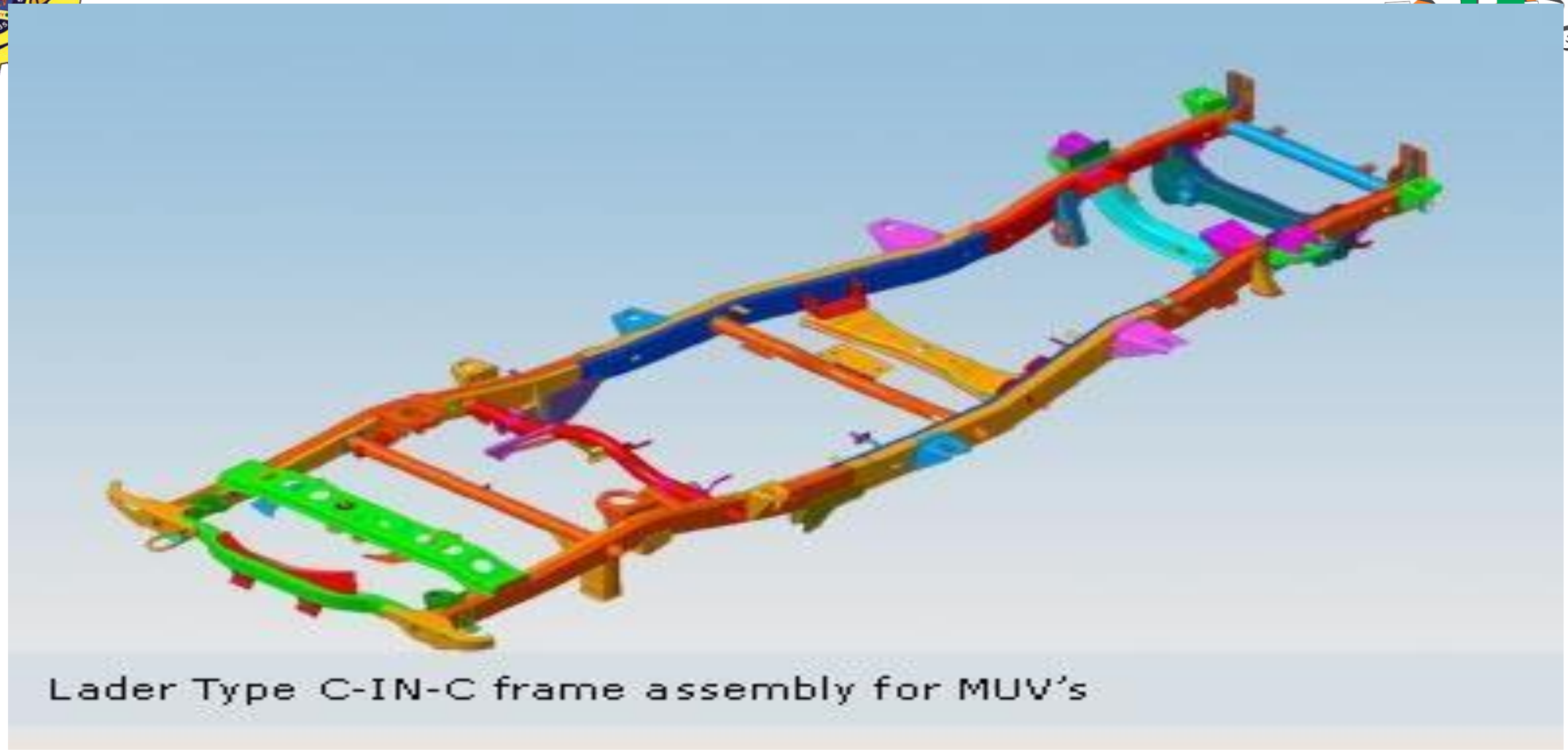
- Main part of the chassis on which the remaining parts of the chassis are mounted. It is a rigid structure that forms a skeleton to hold all the major parts together
- Are made up of Steel section so that they are strong enough to withstand the load and at the same time are also light in weight to reduce dead weight of the vehicle

Forces acting on the members

- Heavy and suddenly applied loads for short duration.
- Combined loads at long interval while taking a curve or when brakes are applied at the same time.
- Inertia loads due to braking.
- Impact loads during hitting.
- Over loading of the vehicle.
- Static load of the components mounted.

Type of Frame

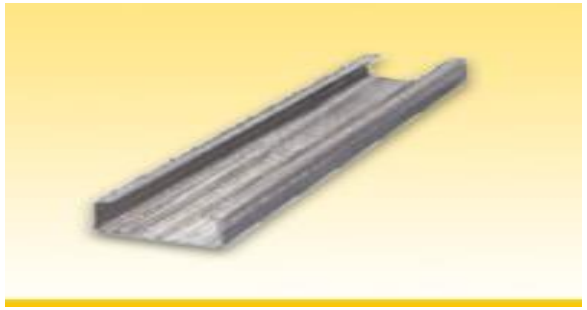
- Ladder type frame or Conventional frame
- Semi Integral Frame
  - Monocoque or Integral Frame
- Sub Frame



Ladder Type Frame

Types of Frames Section

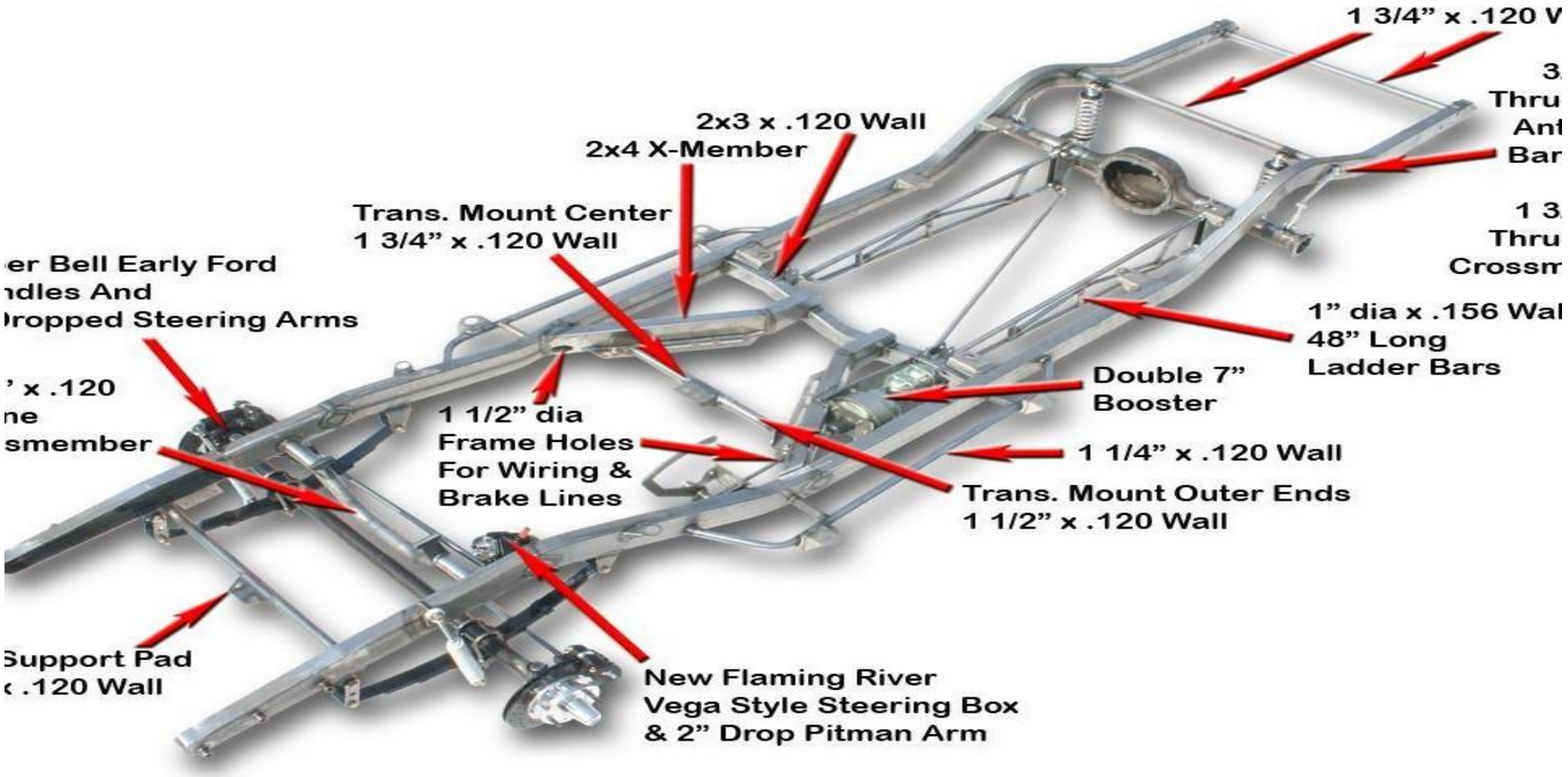
- Channel Section
- Long member of the frame- Bending

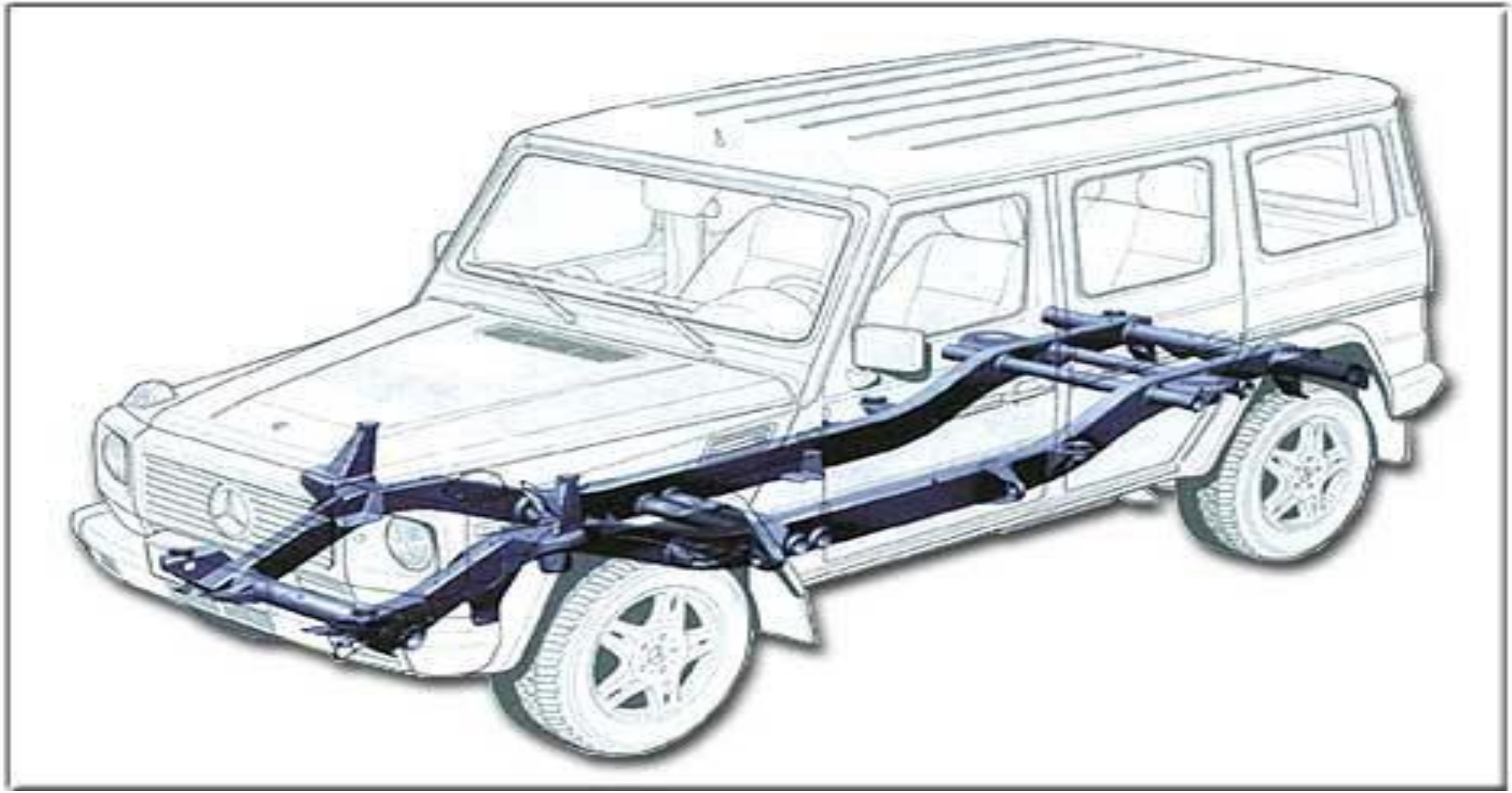


- Box Section
  short member of the frame-Bending & Torsion

- Tubular Section

Three wheeler , scooter - Torsion


1 3/4" x .120 V
3
Thru
Ant
Bar
1 3
Thru
Crossm
2x3 x .120 Wall
2x4 X-Member
Trans. Mount Center
1 3/4" x .120 Wall
er Bell Early Ford
ndles And
Dropped Steering Arms
' x .120
ne
smember
1" dia x .156 Wal
48" Long
Ladder Bars
Double 7"
Booster
1 1/2" dia
Frame Holes
For Wiring &
Brake Lines
1 1/4" x .120 Wall
Trans. Mount Outer Ends
1 1/2" x .120 Wall
Support Pad
x .120 Wall
New Flaming River
Vega Style Steering Box
& 2" Drop Pitman Arm

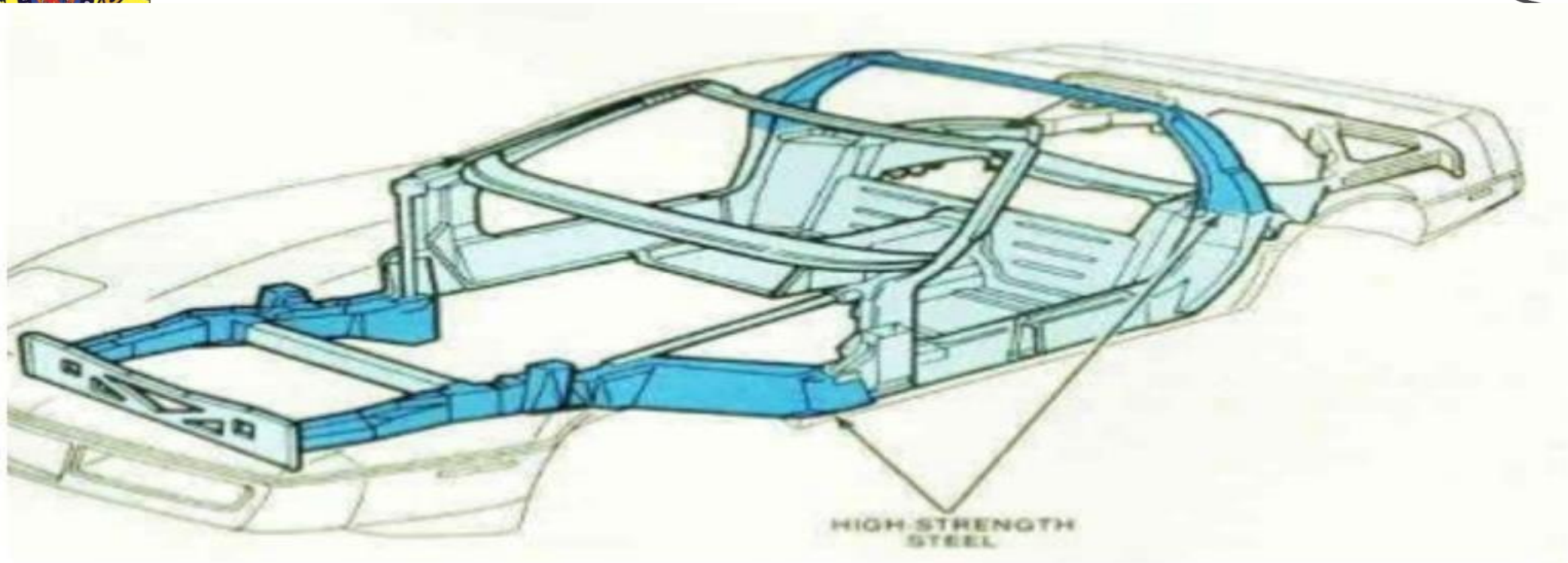


Ladder frame

- Total Loads of the vehicle is transferred to the suspension by the frame
- Body is isolated from the frame deflection with help of the rubber mounting
- Frame taper from the rear to front to permit adequate movement of the steering wheel.
- Upward at the rear end , allow for vertical movement of rear wheel
- Frame is heavy

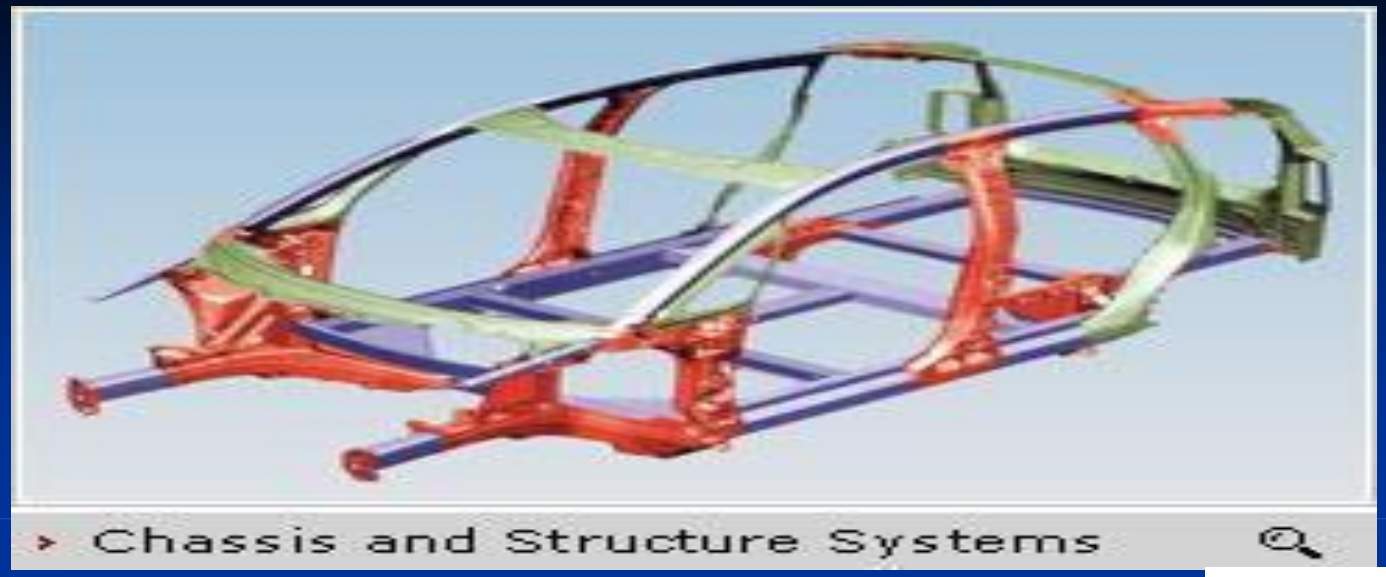
Semi- Integral Frame

- In some vehicles half frame is fixed in the front end on which engine gear box and front suspension is mounted.
- In this case the rubber mountings used in conventional frame between frame and suspension are replaced by more stiff mountings.
- Because of this some of the vehicle load is shared by the frame also. This type of frame is heavier in construction.
- It has the advantage when the vehicle is met with accident the front frame can be taken easily to replace the damaged chassis frame.
- This type of frame is used in some of the European and American cars


HIGH STRENGTH
STEEL

Monocoque or Integral Frame

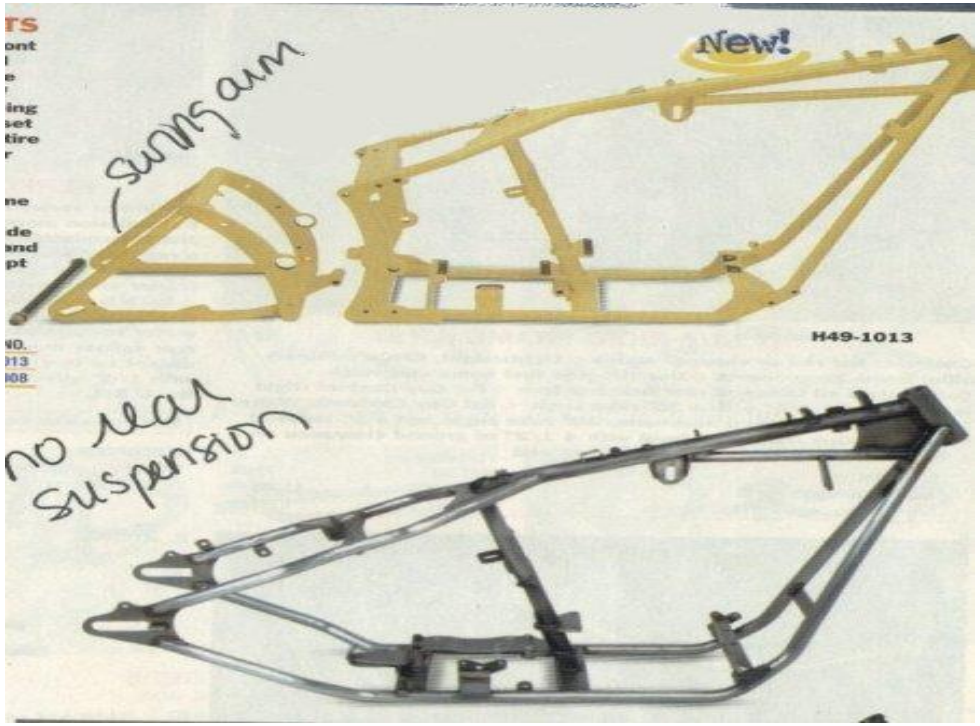
- There is no frame and all assembly units are attached to the body. The chassis, floor are assembled by welding.
- Light weight and allows a lower floor.
- The chassis , floor and body are assembled by from a large number of mild steel pressings.
- This is the modern form of construction for almost all cars and lighter commercial vehicles.



Integral Type Frame

Sub Frame

- The Engine and gear box are carried on a sub-frame supported by a main frame usually three points.
- Isolate the components from the effects of twisting and flexing of the main frame.



Two wheeler Frame

THANK YOU