

A Review on Automotive Heavy-Duty Chassis

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ABSTRACT

The chassis frame is a significant part in a vehicle which it carries the entire load acting on the truck as well as different parts of the automobile. So, chassis must be robust enough to resist the shock, twist, vibration and other stresses. Therefore, the study of chassis under both static and dynamic load are crucial. The variable sections of chassis structure are shaped on the basis of varied loads acting along the length of the automotive to overcome the failure and preserve the safety. But the direct major or minor impacts on chassis frames in accidental cases may root the dynamic unbalancing, chassis misalignment and other problems which affect the vehicle performance as well as the appearance. Due to large and sudden bumps during running conditions may produce the vibrations inside the chassis which cause the prior failure in chassis members. This paper focus on the automotive heavy-duty 407 vehicle chassis under maximum load.

Keywords : Automobile, Chassis, Types, Applications.

I. INTRODUCTION

The chassis frame plays a vital role in the automobiles. All most all components weight is acting on the chassis frame, thus chassis subjected to static, dynamic and cyclic loading condition on the road, therefore chassis must be rigid enough to resist this load [1]. Chassis design should be cost effective, lesser weight, maximum payload, ensures vehicle safety by withstanding the worst loading conditions [2]. The chassis structure must safely support the weight of the vehicle components and transmit loads that result from longitudinal, lateral and vertical accelerations that are experienced in racing environment without failure [3].

Chassis structure is mainly divided into three types as Conventional frame, Integral frame and Semi Integral frame. In conventional frame, it consists of two long side members and 5 to 6 cross members joined together with the help of rivets and joints. In Integral frame, instead of conventional chassis all the units of vehicle are attached to body, which are mostly used in all forms of cars and light commercial vehicles. In Semi Integral frame, half part of frame is fixed on the front side to which engine gearbox and front suspension is mounted [4].

II. THE IMPORTANT FUNCTIONS OF AN AUTOMOTIVE CHASSIS ARE

1. To carry load of the passengers or goods carried in the body.
2. To support the load of the body, engine, gearbox, etc.
3. To withstand the forces caused due to the sudden braking or acceleration. [5]
4. To sustain the stresses caused due to the worse road condition.
5. To withstand centrifugal force while turning.



Fig.1: Truck chassis at laboratory site [6]

III. THE CHASSIS MAINLY CLASSIFIED ACCORDING TO TYPE OF FRAMES

1. Laddered frame chassis.
2. Space frame chassis.
3. Backbone chassis.
4. Monocoque chassis. [7]

• Ladder frame Chassis:

The ladder chassis is also known as body on frame chassis. It is mainly used to support automobiles. It appears as like ladder hence its names suggested as ladder chassis. The ladder chassis consist two long parallel members which is connected through the series of short cross-members.

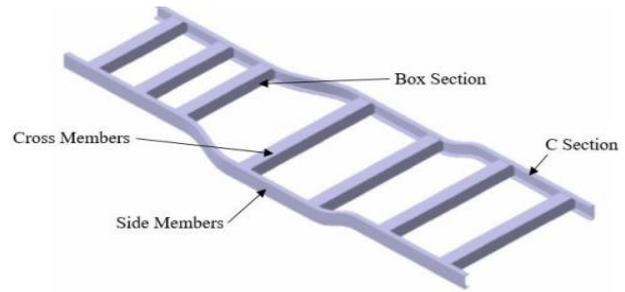


Fig.2: ladder frame chassis [4]

• Space frame chassis:

A space frame chassis is used for structural stability of the automobile. It made up of tubes, that's why it has light weight and offers high torsional rigidity. Mainly it is used in sport cars.

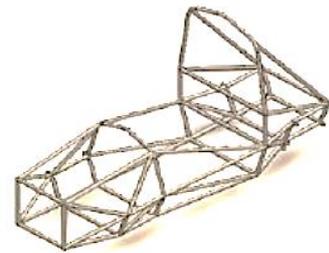


Fig.3: chassis for R20. [8]

• Backbone chassis:

It is type of automobile chassis developed as it consists a strong control structure i.e. backbone chassis. Running along the length of vehicle with other components, such as the engine, suspension and body attached to it this design gives rigidity and strength. It is used in heavy-duty vehicles like trucks and SUVs.

• Monocoque chassis:

Monocoque chassis is a frame or a body which is integrated into a single structure. This type of chassis

is providing external support to the automobile by distributing the load throughout the structure. Monocoque chassis are commonly use in automobile, aircraft, and bicycles for their lightweight and rigid construction.

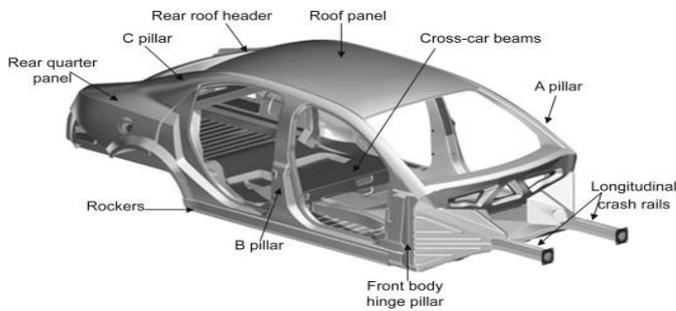


Fig.4: Monocoque chassis [9]

IV. APPLICATIONS OF AUTOMOTIVE CHASSIS

- 1) The chassis are used to provide structural support to the automotive.
- 2) The chassis used to mount the various components like engine, suspensions and steering system.
- 3) It is used to increase the safety of automotive.
- 4) It is used to provide stability to the automotive.
- 5) It is used for distribution of weight throughout the vehicle.
- 6) It is used to reduce the noise and vibration in the automotive.

V. CONCLUSION

We can conclude that the chassis is the main component of the heavy duty automotive. Which distributes load throughout the body. The chassis are available with different structure having various specifications. such as stability and high strength. Hence the chassis play's very crucial role in heavy duty automotive.

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