

THE STUDY OF THE CHASSIS OF FOUR WHEELER

Shri Bhagwan*

*Assistant Professor,

Department of Mechanical Engineering, Faculty of Engineering,
Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, INDIA

Email id: shribhagwan.engineering@tmu.ac.in

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ABSTRACT

A chassis is the fundamental framework that gives the body its power and offers a resting place for all machine components. The basic framework of a vehicle is an example of a chassis. The automobile sector has a serious issue with mass or weight reduction. A few research from the past years were evaluated in this article. In general, the chassis is the fundamental framework of a car, motorbike, or truck. The study paper on chassis analysis, the technique used to analyze chassis, and the material utilized in chassis production is published previously in this article. A variety of analytical and experimental methods are available for evaluating the chassis and the materials used in its manufacture. In various chassis constructions, steel forms are commonly utilized; however, aluminum has also been used in the past.

KEYWORDS: *Automobile, Automotive, Chassis, Framework, Vehicle.*

1. INTRODUCTION

The name "chassis" comes from a French word that meaning "frame" or "primary framework" of a vehicle. The chassis of an automobile is the vehicle's exterior framework, which contains all of the vehicle's components and is placed on the wheels with the assistance of a frame. Simply said, an automotive chassis is a complete vehicle that does not have a body. It's the same as being a fully clothed person. The frame is an essential component of the chassis, on which the vehicle's whole body is attached[1].

Except for big vehicles, the term "chassis" has become a French term that refers to the whole vehicle. With the exception of additional body fittings, when light-heavy vehicles are mono constructed, the whole car is labeled: "The chassis comprises the engine, train power, brakes, steering system, and wheels placed on the frame." The whole vehicle is protected by an interior chassis, which also offers structural support. It's like an animal's skeleton. Over the past several years, the nature and usefulness of on-road vehicles have substantially improved[2].

A chassis is the basic structure that provides the body its power and allows all machine components to rest. A chassis is an example of a vehicle's fundamental structure. The automotive industry has a significant problem in reducing mass or weight. Chassis is a common body structure that employs rich memories during severe injuries and has a substantial impact on product imagery. If the chassis fails, the whole vehicle structure will be destroyed, and it will be impossible to repair it fast. The frame system must be able to safely support and transport the

weight of vehicle components as they accelerate longitudinally, laterally, and vertically in the races[3].

The chassis, often known as the "Frame," is the car's main support structure [4]. It bears all of the car's stresses in both static and dynamic situations. The skeleton of living creatures is comparable to that of a vehicle. In French, the phrase "chassis" comes from the word "chassis." Whether it's a two-wheeler or an automobile, every vehicle needs a chassis framework. As a result, its form is significantly influenced by the kind of vehicle. In most passenger vehicles in the mid-twentieth century, a skeleton was created in the vehicle's chassis, on which the engine, wheels, axle joints, gears, steering motors, frequencies, and suspensions were placed. The body was lightweight attached to the chassis during a technique known as body-on-frame construction[5]. This technique has now been expanded to heavy-duty vehicles, such as trucks with a big central frame, which are susceptible to the pressures required in material transportation, such as the absorption of motor and axle movement, which is permitted by the combination of body and frame. The following functions are performed by chassis:-

- Assists or supports the vehicle's body load
- Provide space and assembly for various vehicle aggregates.
- Supports the weight of a variety of vehicle components, including the drive train, gearbox, and so on.
- Supports the freight as well as the luggage.
- Is resistant to the forces imposed by bad roads.
- Relieves strain during vehicle acceleration and breaking.

In contemporary passenger vehicle designs, the chassis frame and the body are merged into one structural component. The steel body shell is reinforced with bracing, making it sufficiently stiff to resist the imposed stresses. A unit body (or anybody) structure is the name given to this configuration. For better noise insulation, some vehicles have utilized alternative frames or partial "stub" frames. In modern component designs, heavy strength steel also helps to retain energy during collisions and minimize damage[6].

1.1 Chassis' Purpose:

- To sustain the vehicle's body weight and loading
- To assist with car accessories
- To assist with the power and control systems
- To make room for the passengers
- To achieve the ideal aerodynamic design in order to reduce drag.
- To combine all of the vehicle's components

1.2 Types of Chassis

The chassis of a car may be regarded an underrated component. Few people are aware of it, and even fewer are concerned. Although we have no option in selecting the chassis for our vehicle,

familiarity with them will enable you to identify the capabilities and limits of your vehicle. The four main chassis types are as follows in the figure 1 and describe below:-

1.1.1 Ladder chassis: - The Ladder chassis, which is similar to a ladder because it is a kind of ladder, is one of the earliest chassis. Two large, hefty beams are flanked by two smaller beams. The ladder chassis' main selling point was how quickly it could be made. At the dawn of the automobile era, technology was still developing, and the flexibility of a ladder chassis made mass production easier. The chassis also enables the vehicle to be positioned. The ladder's chassis is hefty, and it's still used in vehicles that have to travel over large obstacles.

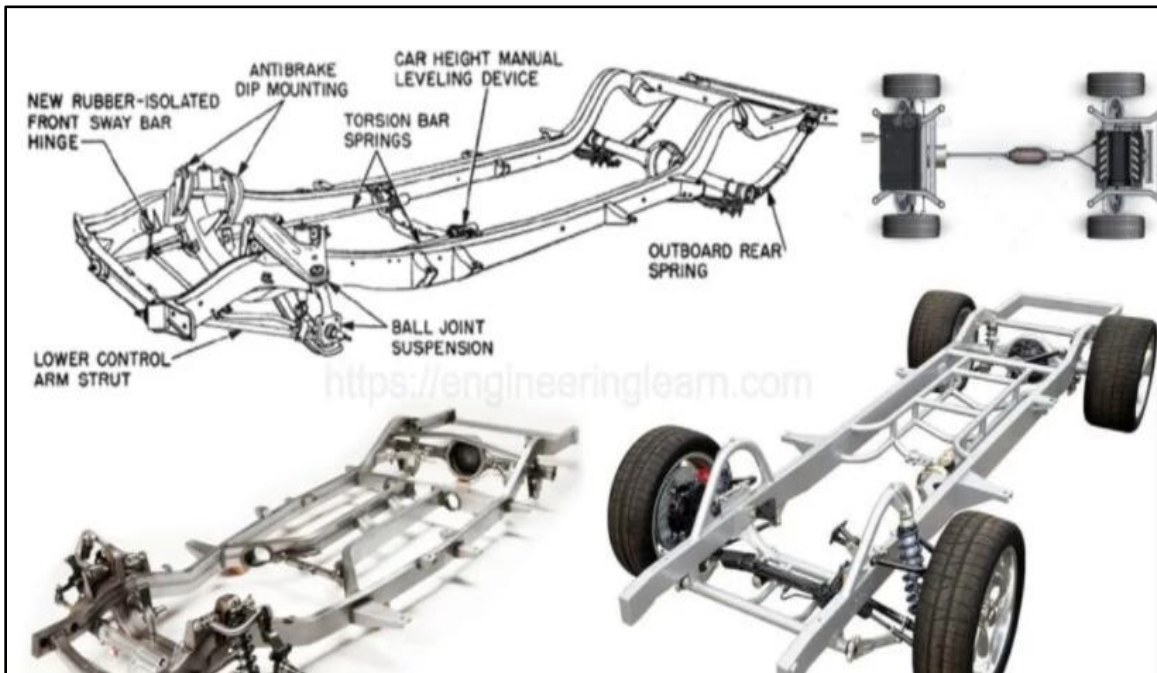


Figure 1: The Different Types of Chassis in the Four Wheeler.

1.1.2 Backbone chassis: -The Backbone chassis, which is similar to a ladder because it is a kind of ladder, is one of the earliest chassis. Two large, hefty beams are flanked by two smaller beams [7]. The ladder chassis' main selling point was how quickly it could be made. At the dawn of the automobile era, technology was still developing, and the flexibility of a ladder chassis made mass production easier. The chassis also enables the vehicle to be positioned. The ladder's chassis is hefty, and it's still used in vehicles that have to travel over large obstacles [8].

1.1.3 Monocoque Chassis: -Its name is also derived from its structural aspect, which is a continuous frame. Monocoque is French for "single shell" or "single hull." There is just one shell. The monocoque was first employed in ships and later in airplanes. It took me a long time to realize that they may even be found in automobiles. A monocoque armchair is constructed of a single piece of furniture with both chassis serving as the frame. Because of its many advantages over the other two chassis, this chassis is perhaps the most frequently utilized.

1.1.4 Tubular chassis: - Tubular chassis were mainly utilized in racing vehicles due to its unrivaled safety. The chassis were updated to three dimensions and were much heavier than the ladder's chassis. To increase total power, they placed a strong structure beneath the doors. On rail vehicles, tube chassis are never utilized.

2. LITERATURE REVIEW

The whole vehicle is protected by an interior chassis, which also offers structural support. It's like an animal's skeleton. Over the past several years, the nature and usefulness of on-road vehicles have substantially improved. A chassis is the basic structure that provides the body its power and allows all machine components to rest. A chassis is an example of a vehicle's fundamental structure. This reduction in mass or weight is a significant issue for the automotive industry[9].

Tubular chassis were most often seen in racing vehicles. The chassis were updated to three dimensions and were much heavier than the ladder's chassis. To increase total power, they placed a strong structure beneath the doors. On rail vehicles, tube chassis are never utilized [10].

3. DISCUSSION

A chassis is the fundamental framework that gives the body its power and offers a resting place for all machine components. The basic framework of a vehicle is an example of a chassis. The automobile sector has a serious issue with mass or weight reduction. Chassis is a typical bodily structure that uses vivid recollections after serious injuries and has a significant effect on product images. The whole vehicle structure will be destroyed if the chassis breaks, and it will be difficult to rebuild it quickly. As the vehicle components accelerate longitudinally, laterally, and vertically in the races, the frame system must be able to safely support and convey their weight.

The chassis, often known as the "Frame," is the primary support component of the vehicle. In both static and dynamic conditions, it bears all of the car's pressures. A live creature's skeleton is similar to that of a vehicle. The word "chassis" is the source of the term "chassis" in French. Every vehicle, whether it's a two-wheeler or a car, need a chassis structure. As a consequence, the kind of vehicle has a major impact on its shape. The engine, wheels, axle joints, gears, steering motors, frequencies, and suspensions were all mounted on a skeleton in the chassis of most passenger cars in the mid-twentieth century. Using a method known as body-on-frame construction, the body was connected to the chassis in a lightweight manner. This method has now been extended to heavy-duty vehicles, such as trucks with a large central frame, which are sensitive to the stresses needed in material transportation, such as motor and axle movement absorption, which is made possible by the coupling of body and frame.

The chassis frame and the body are combined into one structural component in modern passenger car designs. Bracing reinforces the steel body shell, making it rigid enough to withstand the applied pressures. This design is known as a unit body (or unibody) construction. Alternative frames or partial "stub" frames have been used in certain cars to improve noise insulation. Heavy-duty steel is also used in contemporary component designs to assist preserve energy and reduce damage during collisions.

4. CONCLUSION

The chassis, often known as the "Frame," is the primary support component of the vehicle [1]. In both static and dynamic conditions, it bears all of the car's pressures. A live creature's skeleton is similar to that of a vehicle. The word "chassis" is the source of the term "chassis" in French. Every vehicle, whether it's a two-wheeler or a car, need a chassis structure. As a consequence, the kind of vehicle has a major impact on its shape. The engine, wheels, axle joints, gears, steering motors, frequencies, and suspensions were all mounted on a skeleton in the chassis of most passenger cars in the mid-twentieth century. Using a method known as body-on-frame construction, the body was connected to the chassis in a lightweight manner. The chassis frame and the body are combined into one structural component in modern passenger car designs. Bracing reinforces the steel body shell, making it rigid enough to withstand the applied pressures. This design is known as a unit body (or unibody) construction. Alternative frames or partial "stub" frames have been used in certain cars to improve noise insulation. Heavy-duty steel is also used in contemporary component designs to assist preserve energy and reduce damage during collisions. In the analysis, the majority of instances are examined:

- It was discovered that the majority of contemporary researchers utilized popular FEA software, with ABAQUS, NASTRAN, and HYPERVIEW being much less often used.
- The properties of a variety of alternative materials, including carbon fiber, magnesium, titanium, and conventional light steel, have been studied and compared using these literature surveys.
- Despite a thorough examination of many research studies, it was discovered that many investigations on the changeable segment idea and trailer chassis had not been completed.
- In order to estimate chassis life, further research on base material for load variation and the effect of both static and dynamic loads is required.
- As a result, further studies of the chassis and trailer chassis concepts, as well as the materials to be utilized in vehicles, should be conducted and researched.

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