

## Articulated Bogie Application & Classification of Articulated Bogie Designs to Adopt Lighter & Stable Means of Railways

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### ABSTRACT

The importance and development of lighter vehicles has never been so such introduced for the willingness of reducing pollution in the atmosphere, as it been so high now a days. In the world to locomotive and railway industry and need too fast and lighter will never end. It's like an immovable object meets an unstoppable force, tends to create such condition that make us different from all other beings. There is a variety of bogies in present, each have some specific role and properties with different use and capabilities, it has different type and we are about to discuss one of them

For clarification on this, we classified bogies component design, a general analysis of each and every, and has been added to classification on its advantage and disadvantages. In the end of it, the database contains 74 bogies from different other worldwide manufacturers like Bombardier, Fiat, Rotem, Siemens, etc. I would likely take Indian railways as a reference to all this, as to improve and improvise with the latest and most suitable technologies existing or to modify the present rolling stocks. Figure 1 and Figure 2 shows a articulated design.

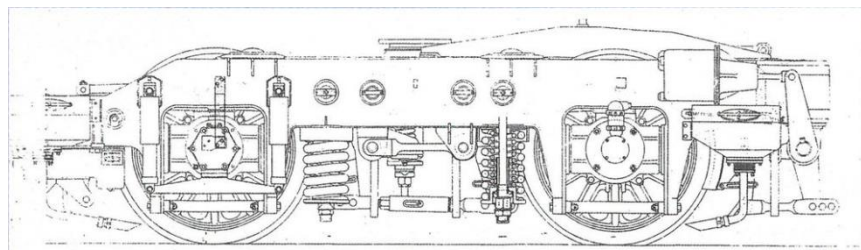


Fig. 1 Articulated Bogie Design

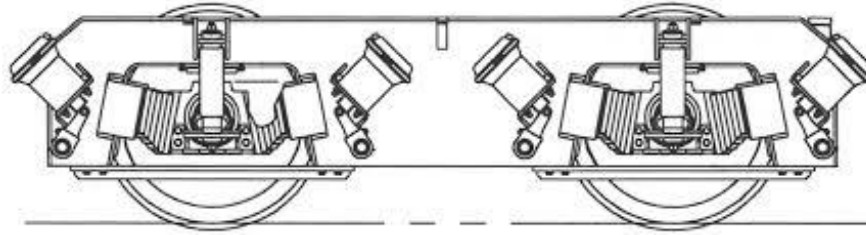


Fig. 2 An elaborated design

## INTRODUCTION

### Motivation

The need to deduct the weight and increase the efficiency in vehicles is also present in rail world. To improve the power and behaviors of vehicle but to reduce cost and damage and energy we have started focusing on different aspect of the machine and one of the major is power to weight ratio.

With the need and knowledge of design to create something which need from the start has been on the move and the work and research can help in developing more and better at present and in future.

### Basic Definition

- **BOGIE:** It is a framework of wheel-sets with motor(in cases of locomotives and EMU) carrying coaches or the Loco itself. It is located under the Body and drives the wagon/loco along the rails
- **JACOB BOGIE:** It is another kind of a bogie in which unlike the traditional one , two car-body is allocated on the bogie which is called articulated.
- **TRACK GAUGE:** The distance between 2 rail tracks in simple way, a track width of a bogie, corresponding to the same distance between two inner sides of rails.
- **CAR-BODY:** The wagon itself.
- **AXLE-LOAD:** The maximum weight that axel is designed to carry.

Figure 2 below shows the structure and appearance of design

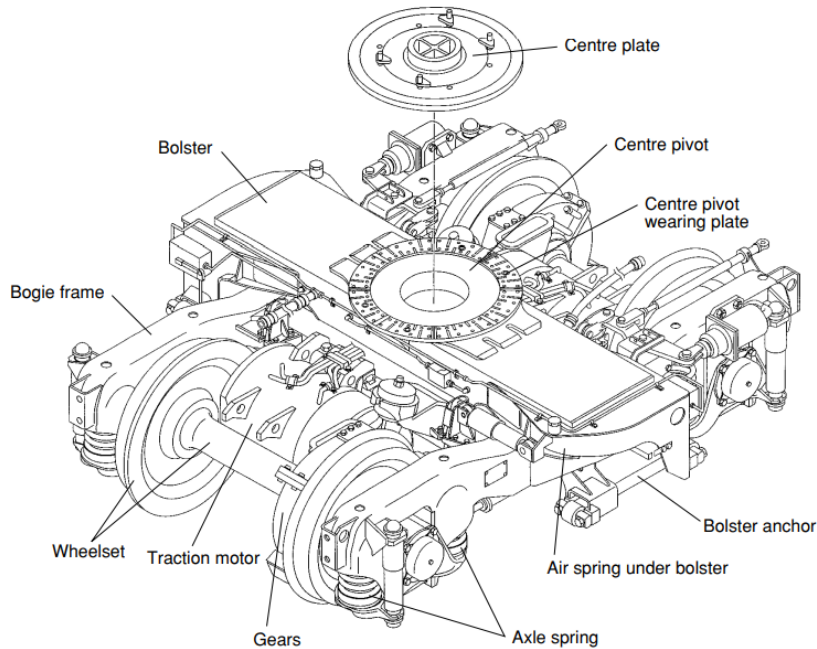


Fig. 2 Structure and appearance of the design

## OBJECTIVE

The objective of this is to provide and give a suitable classification of bogie design conceding the specification and properties of the design and to remove disadvantages. This leads to a difficult phase of modifying the current technologies or to provide the same.

## SCOPE

The way to accomplish the objective of improving to a lighter and faster version of railway system. With the help of the vastest CAD software we are able to design the best without manufacturing them to test.

The simulations would help to provide the best possible design to improve the railway bogie model.

## PROBLEM STATEMENT

The design of wheel, fixed in railway bogie had been widely used in Indian and continental rail world.

As per the design the solid rigid axle on each wheel set tends to lead to damage not only to the wagon and wheel but also to the tracks on high speed cornering and also creating poor cornering and damping behavior. The harsh track impact causes inconvenience to the passenger and sometimes damage to the goods too, decreasing stability and efficiency of the bogie.

The maintenance is always needed and frequent in some cases of hilly areas. However, there is a solution for the problem and it is able to make faster travel. Independent wheel railway bogie is the

**Bogie** is placed under the wagon or loco with a wheel set connected together with bearing attachment. There are two types of bogie Articulated and Non-articulated shown in Fig 4. Mostly the coil spring is the most common used bogie suspension component. Fixed wheel rail bogie ensures the running stability in straight but he curved performance is very much lower since the wheel set are constrained by single solid axle bar. Manufacturer like Fiat, Bombardier, Kawasaki, Siemens able to manufacture bogie able to carry to wagon/car body on it are not just modification, they are new kind which also supports the rail body yet create the stability of the train on either side of the track and curve it is also able to provide comfortable ride by absorption of vibration and reducing the forces acting especially during high speed.

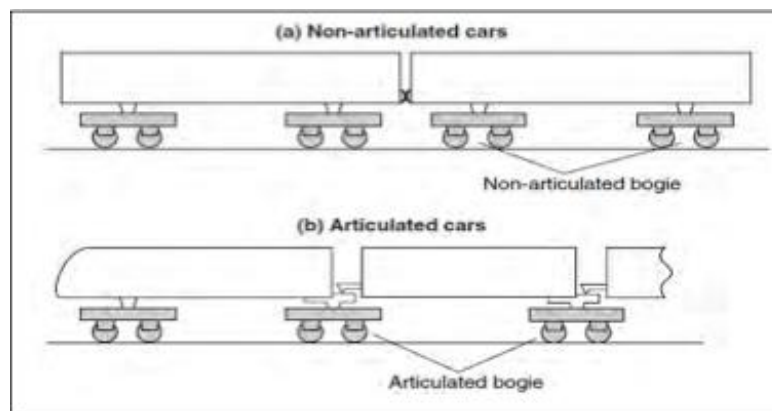


Fig. 4 Articulated and Non-articulated Bogies

We are discussing the articulated one as it is the solution for faster and lighter travel. The rail bogie contains box suspension and also named as primary suspension system acting as the support too the system allows the vertical movement of the frame and the wheel set to provide buttery side, although there is another secondary suspension to absorb the impact and the vibration between the frame and bogie. Fig. 5 below explains articulated bogies in detail.

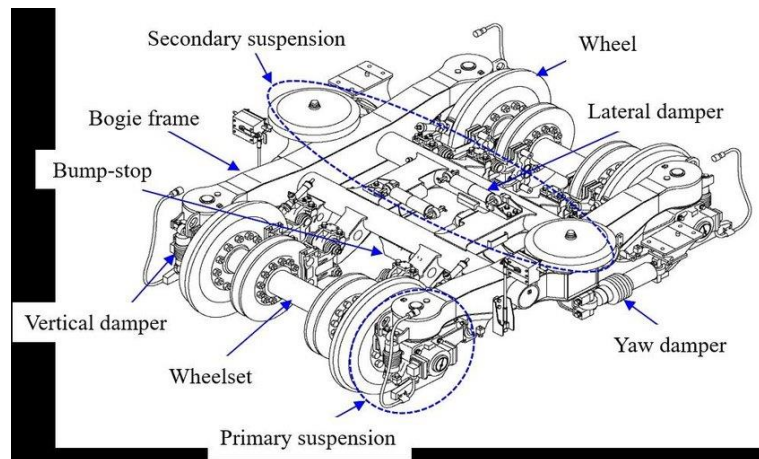


Fig.5 Articulated bogie components

In order to overcome the bad curving performance, fixed wheel must be replaced but independent wheel railway bogie. Lots of simulation are in still progress to develop the more faster version but only of this the Fig 6 show the smoothness and stability the rail car and corner and high speed with better yaw motion of the rail car. From the work of Bombardier, the independent wheel set has the ability to run even at high speed and also ensure smooth cornering

It basically reduces and cuts out most of the withdraw out of the box by creating a smoother and faster curving and straight line performance the wheel movement is adjustable due to which the vibration are very much damped. This will allow us to provide the best possible rail

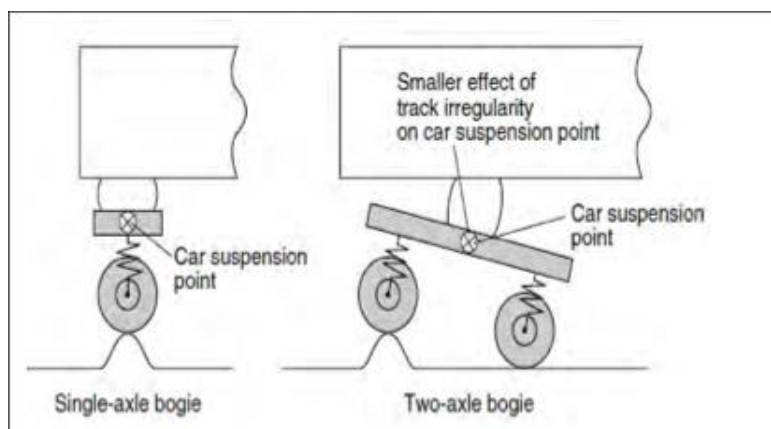


Fig. 6 Shows smoothness and stability of Rail car

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