

Design and Development of Multi-Linkage Suspension System in Heavy Vehicles

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Abstract:- The occupants as well as vehicle structure suffers severely when subjected to excessive fatigue loading if the chassis is provided with direct transmission of the loads carried by rolling wheels of the vehicle. Moreover if the front and the rear wheel axels are allowed to run in bearings rigidly attached to the frame, extremely uncomfortable rides would be resulted. To avoid the transmission of road effects to the passengers while travelling in vehicles on uneven ground, it is, therefore, necessary that the wheels and the axels should be insulated from the frame. For this purpose suspension system is used. A good spring should have more stiffness for better suspension.

The current necessity in the automobile sector is mostly concerned with the comfort of the customer. The suspension system is provided in vehicles to evenly support the weight of the vehicle, to safeguard the working parts of vehicle against fracture caused due to severe stresses and ensuring the comfort of passengers by absorbing and damping the shocks. Currently, in heavy duty vehicles Leaf-spring (Dependent) suspension system is used. Due to dependent suspension provided on rear wheels in vehicle the chances of accident are more. To overcome this failure Multi-link suspension system is introduced.

Keywords: Suspension system, Linkages, Leaf-spring, Vehicles, Fatigue loading, Comfort.

1. INTRODUCTION

The suspension system is the system of tires, tire air, spring, shock absorbers and linkages that connects a

vehicle to its wheel and allows relative motion between them. During cornering, the vehicle is subjected to undesirable effects such as pitch, roll or sway. These effects are absorbed by the suspension system thereby avoiding stress development in the vehicle frame and body. Variation in suspension system design occurs due to various reasons like air resistance, force distribution, space occupied, contribution to unsprung weight and total weight, load levelling cost, etc.

In recent automobiles the suspension system used is independent suspension system for light duty vehicles and dependent suspension system in heavy duty vehicles. Generally, in heavy duty vehicles leaf spring suspension system is used because it is really simple to construct and strong. Although there are many advantages of modern day leaf spring, but the major disadvantage is the ride comfort isn't as great because of the inter-leaf friction between each leaf. To overcome this problem multi-link (independent) suspension system is preferred. In independent suspension, all the road wheels are so connected to the frame that rise and fall of any one wheel has no direct effect on the vehicle body. On the other hand, vehicle with independent suspension ensures continuous road adhesion and does not tilt on one side.

1.1 Problem Statement:

- i. As per manufacturers of highway as well as off-highway equipment & Farmer.

- Free and independent establishment of the kingpin offset, disturbing force and torque developed by the radial load.
 - Considerable opportunities for balancing the pitching movements of vehicles during braking and acceleration.
 - Avoid the damaging of Export quality material while transporting or carrying through road
 - Looking for the lightest and most durable suspension with the smoothest ride.
- ii. As per design for future ambulances national patient safety agency.
- Modified suspension to reduce noise vibration and improve ride while maintaining vehicle stability handling and road handling.

In heavy transport vehicle field existing dependent suspension system unit is used, that is known in Fig 2.1. If some have that is leaf spring suspension. In all cases Leaf spring design for full load condition. Because of that leaf spring not gives the suspension effect. The rattling effect due to shock and vibration coming in the vehicle should be minimizing as per that point of view design new suspension unit for enhancing the performances of suspension system Also change the camber angle due to change camber angle vehicle tilt and chance accident So keep in mind the transportation of marital in trailer and comfortless of patient while travelling in ambulance. Designed the Suspension system loading suspension, it is based on independent suspension phenomenon. The addition feature of this suspension unit is by replacing existing setup and operates independently. As industrial point of view Suspension system has been use in commercial as agriculture trailer and transport vehicle. Also in case of emergency vehicle this Suspension system suspension unit used without compromising speed and comfortless.

As cost point of view this Suspension system suspension unit can be available with affordable prize as compare to existing suspension system. This Suspension system suspension unit provides great performance in terms of smooth, quiet, safe ride by proper utilization of material properties. This Suspension system suspension unit have been manufacture and used commercially because of it has less complexity, easily availability of material and economical so it significantly contributes demand by user for keeps vehicle safety and comfortable.

3. OBJECTIVES OF THE WORK:

The extensive literature survey carried out during course of work clearly shows that there is need of study and independent suspension system unit for heavy vehicle. So the objective of the present work will be as under.

2. NECESSITY OF WORK

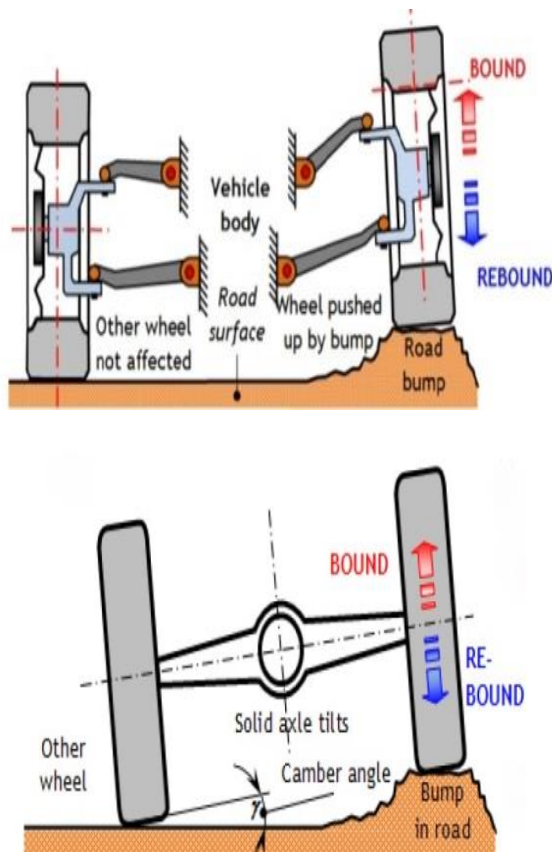


Fig. 2.1: Camber Angle Change with Independent Suspension

3.1 Objectives of the Dissertation:

1. Study the conventional suspension system used in automotive purpose.
2. Analytical design of component like Multi-link suspension system for rear wheel.
3. Multi-body dynamic simulation for Multi-link suspension system for rear wheel car suspension parameter.
4. Load calculation.
5. Put the different road condition on the prototype model.
6. Calculate the suspension parameter behavior with experimental setup.
7. Compare the result with conventional life spring.

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4. CONCLUSION

The objective of this paper is to develop a new multi-link suspension preferred for the heavy vehicle. As per the demand of customer comfort and better vehicle performance, so far, independent suspension system is preferred for heavy vehicles.

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