

# Design and Analysis of Multi-Link Suspension System

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**Abstract:** As there is tremendous development in Suspension Technology, Multi-Link suspension system are considered better independent suspension system among all other independent suspension system. Its simple design and construction makes it way more convenient to install and serve its purpose. As there is vast growth in Agriculture, farming becoming more and more advanced in terms of technology and in that transport vehicles play important role in making agriculture more productive. We saw different scenario where agriculture transport vehicles collapsing because of there conventional suspension system fails to stabilize the loaded vehicle on different road conditions. We tried to see the improvement in performance of vehicle in stabilizing it self by using Multi-Link suspension system

**Keywords:** Suspension, links, spring, vibrations, dampers

## 1. INTRODUCTION

In heavy transport vehicle field existing dependent suspension system unit is used. 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.

## 2. LITERATURE REVIEW

Ashish V. Amrute:- in this paper he worked on design and assignment of multi leaf spring. This work deals with replacement of conventional steel leaf spring of a light commercial vehicle with composite leaf spring using E-glass/Epoxy. The objective is to compare the load carrying capacity, stress and weight savings of composite leaf spring with that of steel leaf springs.

Shpetim LAJQI:- in his paper a terrain Vehicle with four wheels drive and four wheels steer intended to use for recreational purpose is presented. The main purpose is to design the suspension mechanism that fulfills requirements about stability, safety and maneuverability.

Jadhav Mahesh:- in this paper he worked on the stability of composite multi-link on vehicles and their advantages. Efforts have been made to reduce the cost of multilink. The achievement of weight reduction with adequate improvement of mechanical properties has made composite a very replacement material for conventional steel.

## 3. DESIGN AND ANALYSIS OF COMPONENTS OF MULTI LINK SUSPENSION SYSTEM

### Links

Chromium-Molybdenum steel is selected for links because, it has high tensile strength 620-650 MPa in the normalized condition and malleability. It is also easily welded and is considerably stronger and more durable than standard steel.

### Springs

spring is lateral member which is absorb the shock. Springs are difficult to manufacture and require professional Craftmanship so it is not economical to manufacture, so based on the recorded loading conditions of vehicle, the suspensions systems springs are designed and according to that standard springs selected.

Spring Material Selected:

IS GRADE 51CrMoV4as per IS 3195:1992

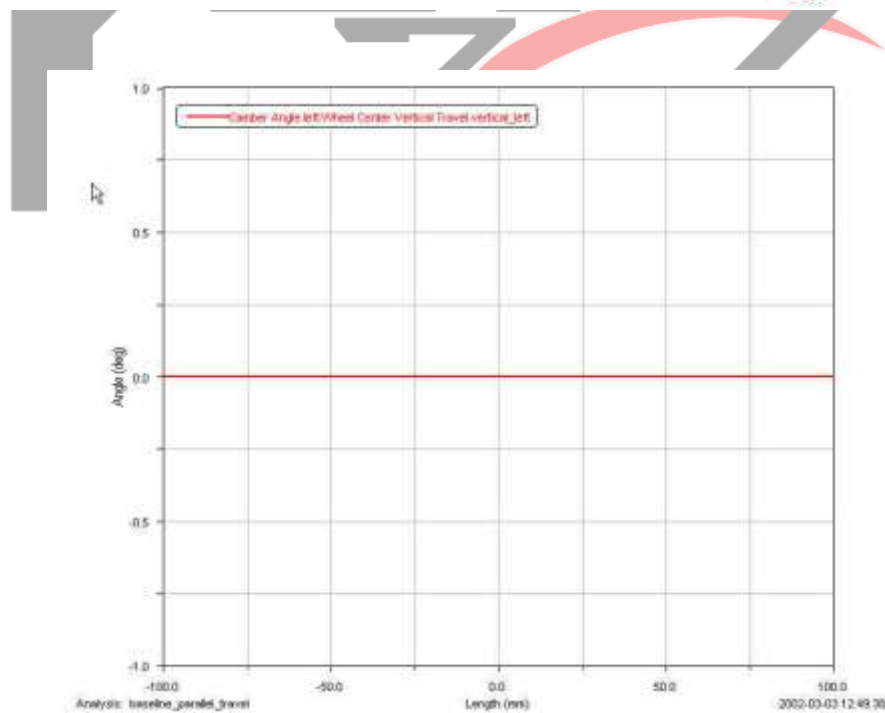
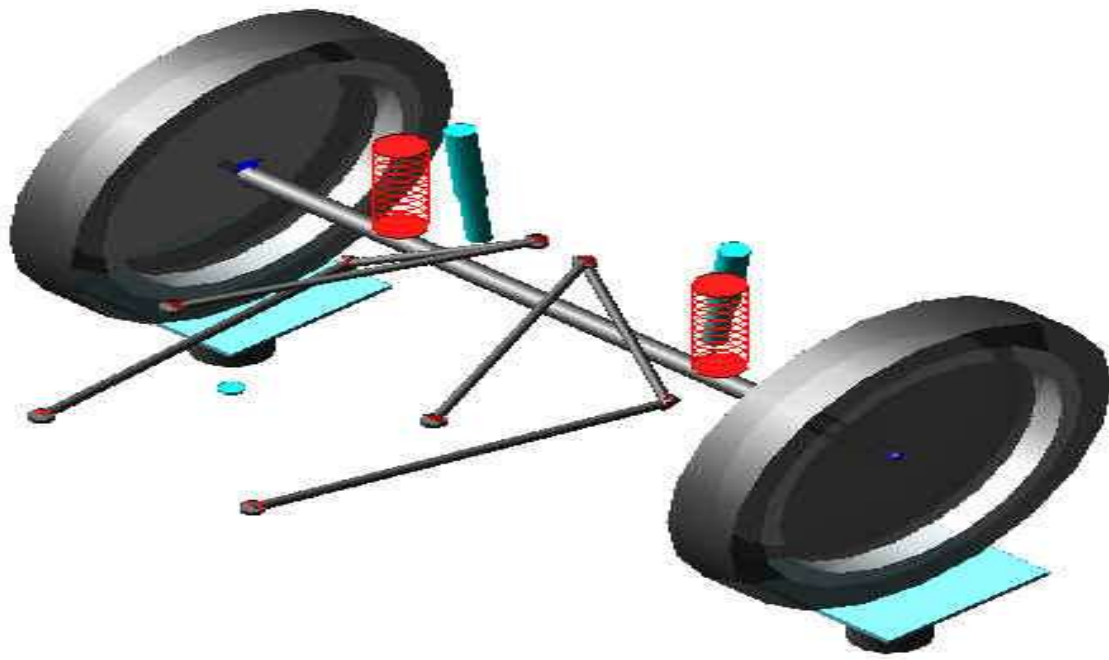
Subscripts 1 & 2in the following equation denote dimension of the outer and inner springs respectively.

The Links and springs which are main components of our Multi Link Suspension System are designed as per input data available. Then this available dimensions of Links are drafted into CAD Software where we specified the Locations of links and Springs with respect to chassis and axle of vehicle.

Then this CAD data available of Multi Link Suspension System we used to Analyse this Suspension system in CAE Software. Here we preferred Adams Car Software which is Suspension System Analysis dedicated Software, Due to its easier and convenient interface. We analysed the performance of our links for Suspension System for different road conditions, to see how much the vehicle remains Stable even after going through road conditions using our Multi Link suspension.

After many tests performed on ADAMS Car, the suspension System showed that it has potential to be used as better replacement old conventional suspension system to enhance vehicle performance.

### Multi Links Suspension System ADAMS Car analysis



Camber Angle Vs Wheel Travel

Horizontal line with no Fluctuations shows that the vehicle succeeded to remain stable during rough road conditions using Multi Link Suspension System.

#### 4. SUMMARY

We discovered the problem behind the collapsing of farming transport vehicles like trailers, which was its conventional suspension system which wasn't delivering enough suspension effect while vehicle running off road conditions and we were convinced that replacement of old suspension system might minimise this destabilization, vibling and collapsing of trailers. So we took into consideration the general trailers chassis and axle dimensions and its loaded and unloaded conditions and designed the 4 links required for new suspension system in CAD software and seeking to see any chance of these links to stand against the travel conditions faced by trailer suspension to keep it stable by analysing them at UNIX Labs so we can finally conclude that they are safe to be used as key component in trailer multi link suspension system and thus our project vision will satisfy.

#### 5. ACKNOWLEDGMENT

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