



Capstone Project

BTME9991/BTME9992

Thesis synopsis

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Title of the thesis

Analysis of Double Wishbone Suspension System Using MechAnalyzer

Research objective

Double wishbone suspension system is generally used to avoid any defect on the body of a vehicle from irregularities of the roads. Which helps comforts to the people, and can obviate from the shocks which comes from wheel through the shaft of the lower body of vehicle. It transfers the force from wheel to the wishbone suspension system which works on the basis of four bar mechanism. By using Mechanalyzer software the four bar mechanism of the system analysis has been done. Analysis of, how it can be reduced in size by using different materials. The size of linkage and selection of material have been decided on the basis of result from analysis done on the software.

Research objective

- 1. Maximizing the traction:** This is one of the functions of suspension system. That is, maximizing the contact of all wheels with the ground, so that the suspension systems maintain the contact of all wheels with the ground by enabling the wheels to move independently with respect to the body or frame of the vehicle. Hence, maximizing the control and the power utilization. If suspension were not there, there would have been the scenarios where in one of the wheels would lose contact with the ground hence losing power.
- 2. Improving steering stability:** The vehicle, while steering a car or taking a turn, is pushed outside due to the centrifugal force and hence it tends to topple sideways. This tendency can result in loss of handling and control over the vehicle. The suspension systems reduce these unwanted movements and hence enhances handling. If there were no suspension system there would be simply toppling off while turning hard and could go rolling away with vehicle.

Providing passenger comfort: The passenger can take nap or drink water or work on a laptop while riding a vehicle. The suspension system dampens the shocks that is generated from the ground reactions due to the bumps on the road and hence increases the passenger's comfort. Without suspension there would be going all over the up and downs even on the slightest of rough road.

Literature of the paper

What is wishbone suspension system

- Double wishbone suspension system is generally used to avoid any defect on the body of a vehicle from irregularities of the roads. Which helps comforts to the people, and can obviate from the shocks which comes from wheel through the shaft of the lower body of vehicle. It transfers the force from wheel to the wishbone suspension system which works on the basis of four bar mechanism.
- By using Mechanalyzer software the four bar mechanism of the system analysis has been done. Analysis of, how it can be reduced in size by using different materials. The size of linkage and selection of material have been decided on the basis of result from analysis done on the software.
- The double wishbone suspension system works on the basis on 4-bar mechanism, it consists linkage, springs, and shock absorbers which obviate from the shock of wheel by absorbing the force which produce due to irregularities on roads.

Four- bar mechanism

- It consists four linkages which connect each other and moves in a parallel plane. It is the simplest movable closed-chain linkage. It has three moving links, one fixed link and four pin points. There is only one constraint on the linkage, which defines a definite motion. This mechanism has many applications, that is, to convert reciprocating motion to the rotational motion and constrain motion. In this system the mechanism is used to convert the reciprocating motion to constraint one.
- The suspension systems play very crucial role in the overall performance of an automobile. There are numerous types of suspension systems here we will use most commonly and major types of the suspension system. Now we like to describe the functions of suspension system.

Need of the system

Due to camber change characteristics, desired under steer qualities are maintained under high lateral acceleration which is the goal for this car. Double wishbone suspension system is more costly as compared to Macpherson strut type suspension system but double wishbone suspension system is best suited for race car.

Double wishbone suspension system vastly has been used in race cars but now a days luxury vehicles also have it. But only difference is the distance between surface and the body of the vehicle. In the graph that is mention clearly if the upper linkage which is over the spring can be alter but for maximum absorption of force it should be enough space for the spring to move up down at the end of the day it makes sure that the smoothness of the vehicle should be at it best if it possible at desire cost and life of suspension.

Scope Of the project

By the time after completing this paper, we are assuming that the knowledge about double wishbone suspension system can be minimize and gives better output than previous systems. Also the use of Mechanalyzer software can be learned during this project which is best analyzing software where we can find out the value of velocity acceleration, force etc by putting different values of the parameters of the systems.

Research Methodology

- In this paper, the analysis of the double-wishbone suspension system is done using the MechAnalyzer. The positions, velocity acceleration and the force are analyzed with respect to time. The graphs for the various links and joints are analyzed in the results and discussions. MechAnalyzer is a software developed by IIT Delhi to perform the kinematics and dynamics analysis of the different mechanism.
- It is being used in this work to perform kinematic analysis of the four- bar mechanism on which the double wishbone suspension system is based. The four-bar mechanism applied in the system is described as follows.
- It consists four linkages which connect each other and moves in a parallel plane. It is the simplest movable closed-chain linkage. It has three moving links, one fixed link and four pin points. There is only one constraint on the linkage, which defines a definite motion. This mechanism has many applications, that is, to convert reciprocating motion to the rotational motion and constrain motion. In this system the mechanism is used to convert the reciprocating motion to constraint one.
- The suspension systems play very crucial role in the overall performance of an automobile. There are numerous types of suspension systems here we will use most commonly and major types of the suspension system. Now we like to describe the functions of suspension system.

Advantages of the system

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