

Design and Analysis of Loop Wheel Suspension System

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Abstract: In today's world, Bicycles are the most favourite choice when it comes to causes like health, pollution, and environment. Several researches have been done in order to make the ride comfortable. Different types of cycles have been developed for various applications like Commuter Bikes, Mountain Bike, and Racing bike. This paper presents the Loop wheel which is designed such that the suspension system is integrated within wheel for higher shock-absorbing performance and better comfort. Loop wheels offer you a smoother ride. Loop wheel springs are usually made up of a composite material carefully developed to offer optimum compression and lateral stability as well as strength and durability. The three loops in every wheel work along as a self-correcting system. This spring system between the hub and the rim of the wheel provides suspension that continuously adjusts to uneven terrain cushioning the rider from abnormalities in the road wheel. The spring configuration permits the torque to be transferred smoothly between the hub and the rim.

Keywords - Design, FEA and fabrication of a wheel with tangential suspension for a two-wheeler vehicle.

I. INTRODUCTION

A Loopwheel is a wheel with integral suspension, designed for better shock-absorbing performance and greater comfort. Loopwheels give you a smoother ride. They are more comfortable than standard wheels: the carbon springs absorb tiring vibration, as well as bumps and shocks. They're designed for everyday use and are strong and durable. The loopwheels for wheelchairs help people push over uneven streets, rough tracks and gravel paths, with less effort, and the carbon springs give you extra power to get up or down kerbs. They reduce jolting and vibration, by as much as two thirds compared with a spoked wheel. They made the decision to focus just on wheelchair wheels because the demand for these was really strong, and but it is very small company. A loopwheel for bikes is an awesome ride. As we know because we've tried them a lot.



Fig. 1: Loop Wheel

The loop wheels concept is found which has become a very beneficial to the world which reduces the wear and tear of bearing that makes novice after completion its specific life which increases the cost and maintenance of a bicycle. In this case the loop wheels gives a better results and reduces this all the bad impacts created by the normal cycles and gives a one new morning to the innovation.

Loopwheel springs are made from a carbon composite material, carefully developed and tested to give optimum compression and lateral stability as well as strength and durability. Specially-designed connectors attach the springs to the hub and rim.

The three loops in each wheel work together as a self-correcting system. This spring system between the hub and the rim of the wheel provides suspension that constantly adjusts to uneven terrain, cushioning the rider from bumps and potholes in the road. In effect, the hub floats within the rim, adjusting constantly as shocks from an uneven road hit the rim of the wheel.



Fig.2 Loopwheel chair

The spring configuration allows the torque to be transferred smoothly between the hub and the rim. The spring rate for wheelchair wheels was specifically chosen. Being carefully developed and tested for this particular application. Every loopwheel within a product category has the same compression rate as another from the same category. We check this to assure constant manufacturing quality.

1.1 Problem Statement:

The normal cycle creates the noise after its life gets reduces and during massive jerk or else while going to tracking it increases the percentage of risk of getting damage to rim which supports the wheels while they are in rotating motion. During off road situation the normal cycle generates a massive force that creates the back pain of human being.

1.2 Objective:

The loop wheel concept has been introduce after considering all this problems facing during our daily life. By observing the leaf suspension in trucks etc the new idea created of loop wheel which gives maximum strength during off road vehicle as well as on road vehicle. The loop design can minimize the shocks that has been created during riding.

II. METHODOLOGY

2.1 Literature study:

We are interested in the research in the automobile field, we are searching the optimization in any component in 2 wheel vehicle. After studied and read different automobile related general and paper we came to know the concept of loop wheel. How loop wheel is used in automobile component design and working. We are starting the detailed study on that concept, and in which component we can use this concept and how can we implement in it.

2.2 Project identification:

Finally after studies of the different research paper and automobile general, we decided the work on the suspension system. The loop wheel concept is inbuilt suspension system in cycles or handicapped vehicles. The ordinary vehicles are with separate suspension system which acquire place increase no of components and also weight but still they can't sustain sudden impacts we are thinking which system can be replaced that will optimize the design process. By recognizing problem in suspension we decided to work on suspension system.

2.3 Design stage:

this stage we are planning to design loop wheel suspension by calculating its width , length and thickness also calculating its bending strength and load sustain capacity. The essential thing in this project is of material selection the material is to be selected who can sustain high compressive load and which is variable.

2.4 System drawing:

The calculated values are use to draw a virtual imaginary drawing in solidworks which provide easy way to design your concept.

2.5 Material procurement:

The specified material strip is purchased from market as per our requirement and holding clips which will hold strip tightly without letting it to slip. The special design rim is also to be purchased from market in which all the stuff is to be fixed.

2.6 Manufacturing stage:

We are assembling all the procured components of our designed, which includes some process like welding, grinding cutting, turning, fitting.

2.7 Testing:

In testing we are evaluating deflection of the loop wheel on the basis of different road level.

III. Design ANALYSIS

Analysis has been done on ANSYS Workbench 14.5 to determine the Maximum deformation. Results were obtained as follows:

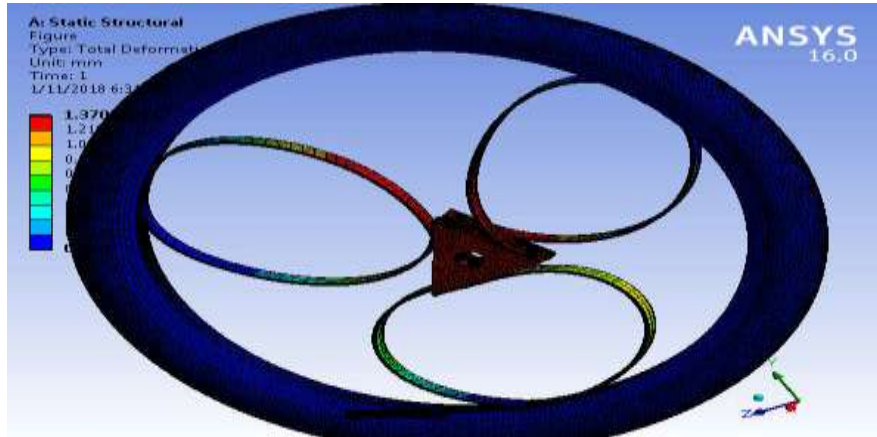


Fig.3 Total Deformation

Results for Deformation:

Time(s)	Minimum(mm)	Maximum(mm)
1	0	1.3709

IV. SUMMARY

Bicycle with loop wheel suspension system provides smoother ride, high shock absorption capacity, avoids the necessity of additional suspension system. Also this loop wheels can find their applications in wheel chairs, mountain bikes because of their capacity to adjust to uneven terrain, cushioning the rider from abnormalities in the road. Analysis on deformation has been done which shows that the calculated and the values obtained using ANSYS are in accordance with each other which suggests that the design is safe.

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