International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 06 Issue: 04 | Apr 2019 www.irjet.net p-ISSN: 2395-0072

DESIGN AND OPTIMIZATION OF LOOPWHEEL

Chinmay Dixit[1], Prathmesh Jadhav[2], Samiksha Salvi[3], Prof S.P Jadhav[4]

[1,2,3]Student, Department of Mechanical Engineering, Bharathi Vidyapeeth College of Engineering, Navi Mumbai, Maharashtra, India-400 614
[4]Professor, Department of Mechanical Engineering, Bharathi Vidyapeeth College of Engineering, Navi Mumbai, Maharashtra, India-400 614

Abstract:- The project is about the modelling and optimization of the loop wheel. The loop wheel is a new and revolutionary wheel designed for extreme comfort while riding your bicycle. This means that the loop wheel absorbs more vibrations compared to a traditional wheel. We wish to reduce this price by making suitable material substitutions for the current materials which are extremely high-end e.g. carbon fiber. The design will be completely new and other materials will be used which can give similar results as the original product or even better but be considerably cheaper than them.

1. INTRODUCTION

The wheel was invented by the cave men in the stone age when they felt the need for transportation. The first wheel designed consisted of a wooden circle with holes to pass a shaft through it. This wheel was solid and heavy which made transportation difficult. Over the years the wheel kept getting better and better but its basic design was the same only the materials for manufacturing changed. The loop wheel is a completely new way of looking at motion where the wheel and the suspension are integrated and provides much more comfort than any other wheel. This significantly reduces the different parts used compared to a regular wheel.

1.1 WORKING

When load is applied on one loop the hub changes its centre of gravity and applies the load on the adjoining loops. The Loops are attached to the triangular joint using vertical screws. While the hub is joined to the triangular joint using horizontal screws. This load is then transferred by the loop to the hub which in turn transfers it to the other two loops, hence equal load distribution takes place. This reduces the vibrations considerably and ensures a smoother ride.

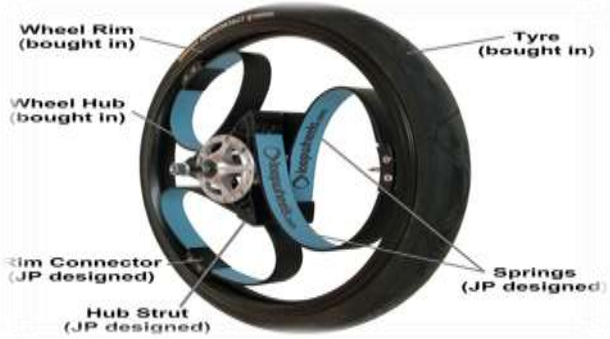

Fig-1 Loop wheel model

2. Design

The overall diameter of the hub is 194mm. The holes in the hub which are for material optimization are of 8mm diameter each and are 54 in total. The triangular element joins the hub and the loop. The triangular joint is 40mm in width and has a height of 50mm. The loop is the part which takes on the load and distributes it using the hub as its proponent. The loop is an elliptical shaped strip with a major diameter of 300mm and a minor diameter of 200mm after prestressing it.

Fig-2 Loop wheel Assembly

Table -1: Material Choices

SR.NO	COMPONENT	MATERIAL
1.	Hub	Aluminum Alloy 7075 T6
2.	Triangular joint	Aluminum Alloy 7075 T6
3.	Loop Leaf Springs	Carbon Fiber UD- Type
4.	Tyre	Natural Rubber
5.	Tyre Rim and Holders	Stainless Steel
6.	Bolts	Stainless steel

The rim is made of stainless steel and has an outer diameter of 637 mm and inner diameter of 601 mm. There are 3 holders placed at 120 degrees each for the placement of the loop strips. The thickness of the holders is 15 mm. Bolts are made of stainless steel there are 3 different types of bolts, one of them is used to hold together the hub and the triangular joints and the other is used to hold the leaf springs and the spring holders, which are joined to the Tyre rim. The 3rd one joins the loop and triangular joint.

3. Results and Analysis

In the first analysis the Tyre was static structural. In this one we have applied an acceleration due to gravity; 10m/s was applied on a cycle which is the average speed of a cyclist. During these dynamic conditions we were able to see the deformation and the stress as well as the strain developed in the wheel which would simulate real world conditions. The inputs in the analysis also included the weight of the person which was given as 1000N.

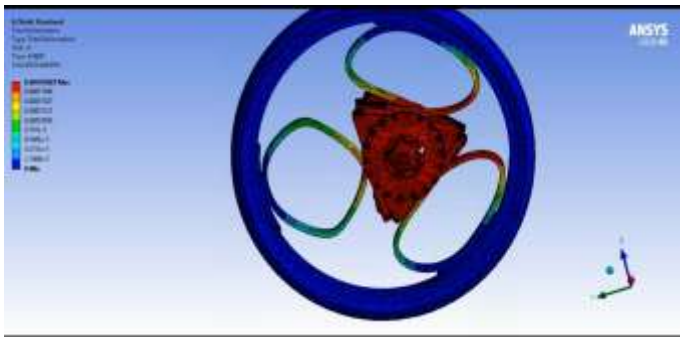

Fig -3.1: Total Deformation

Fig-3.2 Equivalent Strain Distribution

4. CONCLUSIONS

From proposed system following points are conclude:

- The Loop wheel is a revolutionary new solution for having a more comfortable ride.
- It is able to absorb more vibrations compared to a normal wheel.
- It is able to provide more damping while riding a bicycle.
- Our version of the wheel is considerably cheaper compared to the one launched by jelly products.

Integrity of the system is not compromised even if a 100 kg person rides the cycle at 10 m/s.

ACKNOWLEDGEMENT

I would like to express my special gratitude and thanks for giving us such attention and time to Prof. Ganesh Katke, for giving us his valuable time and helping us in the project.

REFERENCES

[1] Design and Analysis of Loop Spring Suspension System in Bicycle **Lakhan Agrawal, Pavan Jadhav, Aakash Patil, Akshay Ahire, S. M. Jadhav** 1234Student, Department of Mechanical Engineering, Smt. Kashibai Navale College of Engineering, Pune Assistant Professor, Department of Mechanical Engineering, Smt. Kashibai Navale College of Engineering, Pune.

[2] **IOSR Journal: - http://www.iosrjournals.org/iosr-jmce/papers/NCRIME-2018/Volume5/3.%2012-15.pdf (e-ISSN: 2278-1684)**

[3] **IJRITCC :- http://www.ijritcc.org/download/conferences/ICIIIME_2017/ICIIIME_2017_Track/1498467346_26-06-2017.pdf (ISSN: 2321-8169**)

BIOGRAPHIES

Prathmesh J. Jadhav currently studying as a student in Bharati Vidyapeeth's College of Engineering, Navi Mumbai. His field of interest are Fluid Mechanics, Computer Aided Design (CAD) & Operations Research (OR).

Chinmay C. Dixit currently studying as a student in Bharati Vidyapeeth's College of Engineering, Navi Mumbai. His field of interest are Mechatronics & Computer Aided Engineering (CAE).

Samiksha S. Salvi currently studying as a student in Bharati Vidyapeeth's College of Engineering, Navi Mumbai. His field of interest are Operations Research (OR).

Prof. Sunil P. Jadhav is a professor at Bharati Vidyapeeth's College of Engineering, Navi Mumbai