

Design and Manufacturing of Steering free Bike for Ham-handed Persons

Punjabi C.I*, Saskar V.R, Shinde M.T, Dagale T.P, Shinde V.B

Department of Production Engineering, Amritvahini College of Engineering, Sangamner,
Savitribai Phule Pune University, Pune Maharashtra, India
*charanjyotpunjabi7@gmail.com

Abstract

Transportation is the prime requirement of people for moving self or goods from one place to another. But for ham handed person it becomes more difficult to commute and to perform their day to day activities like working, education, shopping etc. as they have to constantly depend on others for getting assistance to alight and board the vehicle. This project is the solution for physically challenged community using which they can commute and lead an independent and normal life.

Keywords-Bike, Hand Disability, Mobility, Comfort, Chain and Sprocket

1. Introduction

Nowadays transportation is the major requirement for an individual to reach the destination on time. People with no physical disability are fortunate they are independent without any restriction. People with disability, specially ham handed are unfortunate. Disability is the repercussion of an impairment which can be mental, physical, emotional, vision, sensory. Disabilities can occur in upper extremities as well as in lower extremities. Thus these people become more dependants and lose their self-confidence. They face difficulties in using public as well as private transportation facilities. A national level survey conducted in India by the Central Government of India once in ten years revealed that, around 27 million people which are about 2.21% of the Indians are differently able. Among them, around 14.98 million were men while 11.84 million were women. Thus, the percentage of disabled people in rural area was higher than those in urban areas. A total of 5.43 million people were identified with disabilities in movement which was the highest among all other disabled categories such as

hearing, seeing etc. in terms of numbers of people affected.

Physical disability is termed as handicap, common people can easily do business or job away from their home due to easy transportation. But for handicapped person it becomes difficult to perform all this activities. Access to transport will help them to live their life independently.

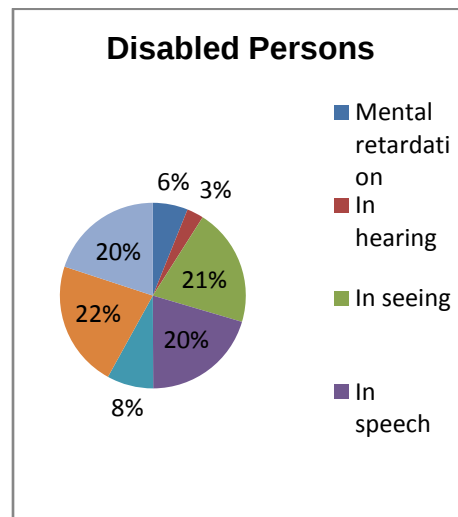


Fig.1 Population of people with disabilities by type of disability. [3]

2. LITERATURE REVIEW

E.S.Esakkiraj, S.Neeraj, et al., explained that the people with disability in their legs are able to drive a physically challenged vehicle designed with dummy rear axle. It is not possible for a person with disability in their hands to drive such a vehicle as the vehicle's control system is present in the hands. For a hand disabled person driving a vehicle is possible by legs will be possible if the entire vehicle's control is transferred to legs. The leg-operated vehicle is fabricated by using simple mechanisms for steering, acceleration and braking which will enable the person to drive the vehicle. [1]

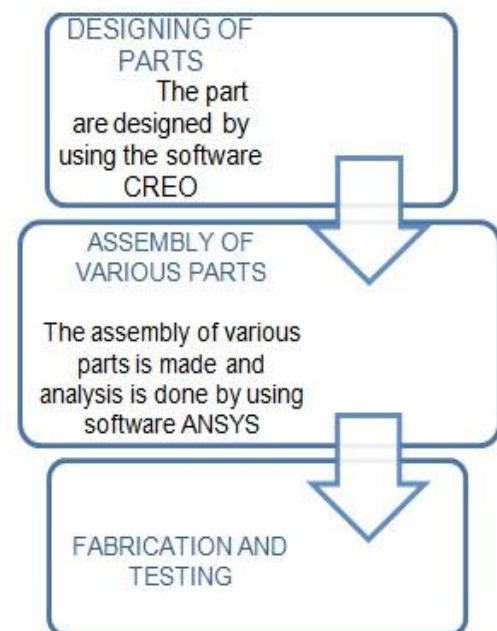
Sathish Kumar. A. T, Praveen. M, et al., As physically challenged peoples are unable to access the height which is so high above their heads so we are providing some suspensions for elevating them to certain heights. We are using the hydraulic concepts mixed with the power source for lifting their seating. Lifting concept is being used for elevating the seating of our wheel chair for the physically challenged people for accessing the inaccessible areas. Since, Hydraulics are a very powerful tool for applying a ton of force (no pun intended) where you want, when you want it, so they are used as a power source. It will be a much needed tool for the physically challenged people to be independent for doing their own work. [2]

B. Sathish Kumar, Vinod K. Banthia, et al., In today's world, transportation has become one of the prime requirements of people for moving self or goods from one place to another. We have even come across people travelling for more than 200 km every day for reaching their work place. Mobility has thus become an essential part of our lives with many development and improvements happening in this field. Because of the changing lifestyle of today's world, there is a huge reduction in the level of interactions within the people group. In these conditions it becomes more difficult for physically challenged people to commute and to perform their day to day activities like working,

education, shopping etc. as they have to constantly depend on others for getting assistance to alight and board the vehicle. In this project. a feasible design solution in form of a user friendly three wheeler vehicle, which allows physically challenged people to commute on their own and perform their activities without anyone's assistance, has been proposed.[3]

Dale L. Peterson, Mont Hubbard, described the control of a bicycle has been well studied when a steer torque is used as the control input. Less has been done to investigate the control of a hands free bicycle through the rider's lean relative to the bicycle frame. In this work, we extend a verified benchmark bicycle model to include a rider with the ability to lean in and out of the plane of the bicycle frame. [4]

3. METHODOLOGY



4. DETAILS OF HANDS FREE BIKE

General considerations in designing the mechanism for ham handed bike:

Following are the general considerations in designing the mechanism for ham handed bike:

1. *Type of Load and Stresses Caused By Load:*

The load on machine component may act in several ways due to which internal stresses are setup.

2. Motion of Parts of Kinematics of Machine:
The successful operation of any machine depends on the simplest arrangement of parts which will be in given require motion.

3. Selection of Material:

It is essential that designer should have through knowledge of the properties of material under working conditions the required characteristics of the materials are strength, durability, weight resistance for corrosion, machinability.

4. Form and Size of Parts:

Form and size are based on judgment the smallest particle cross section may be used but it may be checked that stresses induced in the designed cross section is safe. It is necessary to know the forces which the part must sustain to designer.

5. Convenient and Economical Features:

In designing rating features of machine should be carefully studied. The starting, controlling and convenient handling is required. The adjustment for wear must be provided expelling the various take up devices and arranging them that alignment of the part is provided.

6. Safety of Operations:

Some of the machines has part has problem of safety with it, especially those who have moving parts within it. Therefore any moving part of machine which is within the zone of worker is consider an accident, hazard and may lead to injury, so the safety measures should be taken while operating any machine.

5. CONSTRUCTION & WORKING

- a) The fig shows the working of our mechanism for hands free bike. It consist of two shafts, two sprockets, chain, bearings etc.
- b) Disc along with paddles attached to it is mounted on a vertical shaft .The disc also

carries a sprocket which is mounted above the disc.

- c) Hence power is transmitted from one shaft to another shaft through sprocket mounted on one shaft to sprocket wheel mounted on the other shaft.
- d) The purpose of steering is achieved with the help of transmission caused in the mechanism with the help of peddle. So we can direct vehicle by moving peddle in left or right direction.

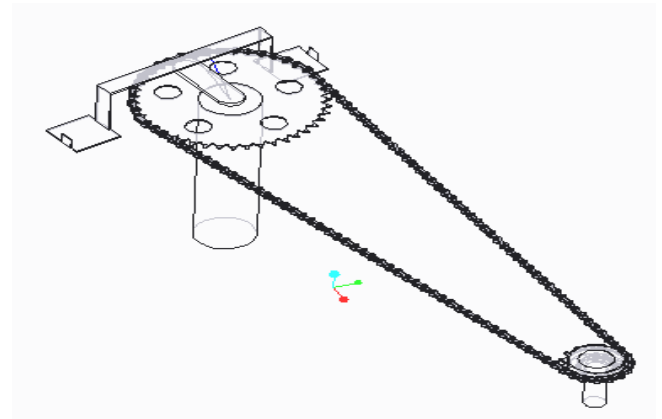


Fig.2: Mechanism of Ham Handed Bike.

Fabricated Ham-Handed Bike



Fig. 3 Fabricated model of Ham Handed Bike.

6. BILL OF MATERIAL

Table 1: Bill of Material

Sr. No	Material	Material Size	Quantity	Material Cost/Manufacturing Cost
1	Shaft	φ25mm x 400mm	1	350
2	Bush	φ35mm x 22mm	2	80
3	Supporting Hub	φ60mm x 70mm	2	220
4	Disc	φ250mm	1	450
5	Chain	Std.	1	170
6	Sprocket	Std.	1	70
7	Sprocket Wheel	Std.	1	55
8	Bearing	6205	4	640
9	Nut, Bolt, Washer	M16 x 1.5"	4	40
		M8 x 1"	8	32
		M6 x 0.75"	6	15
		M10 x 1"	12	60
10	Supporting Wheel	Std	2	4000
11	Bike	-	1	7500
12	Miscellaneous			500
13	Overhead Cost	-	-	1500
14	Machining & Fabrication			1500
			Total	Rs.17182

Advantages

- It is easy to control when person get synchronized with bike.
- It is less costly as compared to other tricycles for handicap persons
- It is light in weight.
- It reduces the efforts of handicapped person.

Limitation

- Difficult to handle until get command over control mechanism.
- Its assembly is complicated.
- Skilled person is required.

7. CONCLUSION

Vehicle is designed for the physically challenged person which can be driven and controlled by legs in which the

steering control is transferred from hands to legs by a technical modification.

REFERENCES

- [1] E.S.Esakkiraj, S.Neeraj (2015), "Modification of the two wheeler vehicle for physically challenged persons", an iso 3297: 2007 certified organization vol. 4, issue 3, March 2015.
- [2] Sathish Kumar. A. T , Praveen. M et. Al "Design of Modernized Vehicle Physically Challenged People" An ISO 3297: 2007 Certified Organization Volume 4, Special Issue 2, February 2015.
- [3] B. Sathish Kumar , Vinod K. Banthia," Design of three wheeler vehicle for physically challenged people", Sastech journal vol.12 April 2013.
- [4] Dale L. Peterson, Mont Hubbard(2008)," Yaw rate and velocity tracking control of a hands-free bicycle", 2008 ASME International Mechanical Engineering Congress and Exposition November 2-6, 2008, Boston, Massachusetts, USA.
- [5] V.B, Bhandari "the design of machine elements". 3rd edition, Publisher, Tata McGraw-Hill reprinted in 2010.

Thermo- Mechanical Comparative Analysis of I. C. Engine Piston with Conventional & Modified Geometry using FEA

Saurabh A. Joshi*, Yogesh Muli, Dhananjay R. Dolas

Mechanical Engineering Department, MGM's Jawaharlal Nehru Engineering College, Aurangabad, Maharashtra India.

*saurabhj810@gmail.com

Abstract

The consistent evolution of IC engines demand even more improvisations in all its aspects to meet the ever-increasing desire of power and economy. Pistons, being one of the most crucial parts of the engine have undergone a vast improvement in the course of time, and still continue to modify. As for the piston, there are a different number of aspects like design characteristics, material selection and physical properties like volume and weight, which play an important role in deciding the output expectancy of the engine. The objective of this study is to do an analysis for thermal and static structural effects on two pistons, each subjected to identical working conditions, but have slight modifications in the geometry. The results of the investigation recorded will be compared simultaneously to find the outcome produced due to geometry optimization. The important tool of FEA will be employed to get precise results for the study.

Keywords: FEA, optimization

1. Introduction

The working condition to which an IC engine piston is subjected is tougher and more critical compared to any other constituent part of the engine. The thermal and mechanical stress which the piston bears is greater in magnitude which in turn leads to failure of the pistons in one way or the other. Hence, the condition of any piston in the engine at any given time determines the output quality. The various factors relating to the piston, which contribute to the efficient functioning of the engine include design characteristics like shape, size and orientation, appropriate material selection and physical properties like mass, volume, surface area, etc. The most suitable material employed for manufacturing of pistons is mostly aluminium, since it balances various factors like strength, cost and production ease, etc. The various factors attributed to the mass of the piston are engine balancing problems and the inertia forces that needs to be overcome while producing the power. Hence the optimization in this field is quite crucial. The deflection due to pressure applied after optimization is more than before optimization

and this value is taken into consideration for design purpose. The stress distribution on the piston mainly depends on the deformation of piston. Therefore, in order to reduce the stress concentration, the piston crown should have enough stiffness to reduce the deformation [2]. Mass varies linearly w.r.t. crown thickness and also varies linearly w.r.t Skirt Length in the given range [3]. Most of the literature review suggests that the material can be removed from the bottom. The material is removed to reduce the weight of the piston so as to improve the efficiency. It is essential to obtain the optimized results for new piston with reduced material [4].