Design and Fabrication of Self Proplled Wheel

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1. INTRODUCTION

An Electric vehicle (EV) uses one or more electric motor or traction motor for propulsion. An electric vehicle may be powered through a collector system by electricity from off-vehicle sources, or may be self- contained with battery solar panels or an electric generator to convert fuel to electric generator to convert fuel to electricity.
An electric bicycle, also known as an e-bike, is a bicycle with an integrated electric motor which can be used for propulsion. Many kind of e bikes are available worldwide, from e-bikes that only have a small motor to assist the rider's pedal-power to somewhat more powerful e-bikes which tends to closer to moped style functionality.
Self-propelled wheel is a wheel which can turn an ordinary bicycle into an electric cycle with only simple effort. This wheel is a simple solution for the problems like increasing pollution and increasing price of petroleum products. This wheel is powered by the motor integrated with the wheel. This wheel replaces the front wheel of the existing ordinary bicycle and turns it into an electric Cycle. This wheel can be used to convert almost all type of vehicle into an electric vehicle.

2. MATERIALS USED

Different types of materials are used in the construction of the self- propelled wheel. Each and every materials are selected based on their properties and because of their need in the machine. Using of different materials for the construction of the machine improves the machine's quality without decreasing the strength or durability.
Materials employed in the machine are:

- Cold rolled steel pipe
- Rectangular cross sectional pipe
- Polypropylene rollers
- Steel fasteners
- Steel Spring washer
- Rubber lining
- Rubber tire

Various materials are assembled to make the machine effectively and efficiently. All Used materials are readily available in the market. Also they all are easily machinable and durable.

3. OPERATIONS

Various types of operations are to be performed while fabricating the wheel.
Many operations need more time and working skill.
Some of the operations performed are

- designing
- Planning
- Bending
- Lathe
- Welding

DESIGNING
The idea of the self-propelled wheel was originated while finding a suitable alternative for the petroleum. As we all know electric vehicles are the futures of automobiles. Thus the idea of converting the existing bicycle into an electric vehicle starts.

Design of the wheel is simple and practical. The conventional cycle wheels are modified and fitted with the electric motor which in turn rotates the wheel and propels the cycle.

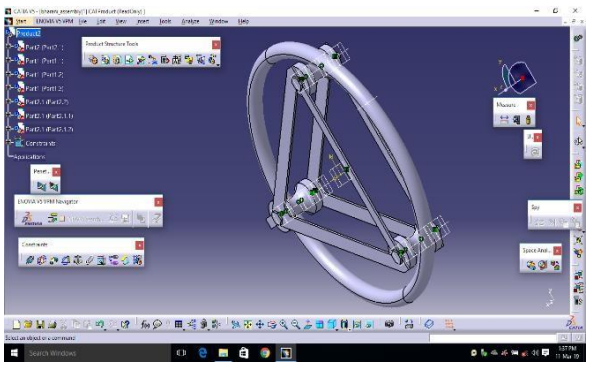

Fig: Design of the wheel

This design can be further modified and revised based on the materials used and using advanced technologies like 3D printing and using less density high strength materials.

PLANNING
In planning phase the materials and the methods to be used are identified and arranged accordingly. The design was finalized and the fabrication of the wheel was done.

BENDING

The fabrication starts from bending the outer rim of the wheel. Roller bending machine is a special purpose machine used for bending of any cross section into a perfect circle or semi-circle or to some extent.

Once the wheel is bent in to a circle the extra section is trimmed and welded together.

Fig: Bending Machine

LATHE

A lathe is a machine that rotates a work piece about an axis of rotation to perform various operations such as cutting, sanding, knurling, drilling, boring, facing and turning, with tools that are applied to the work piece to create an object with symmetry about an axis.

The usage of lathe plays a major role in machining the polypropylene rollers.

The polypropylene rod is first cut into 4 sections of each 4 inches. First the facing is done to level the irregularities of the face. Then a through hole is drilled in the roller and boring is performed to enlarge the hole for fitting the bearings on both the sides. Finally a U groove of 1.5 inch is made on the roller so that the roller can roll over the outer rim of the wheel.

Fig: Roller

Boring on the side was carefully done to make a transition fit of the bearing in the roller. Each roller was machined accurately and uniformly to ensure the smooth running of the wheel.

Drive roller was fitted with the freewheel on onside and with bearing on other side to give the driving power from the motor.

WELDING

Welding is a fabrication or sculptural process that joins materials, usually metals or thermoplastics, by using high heat to melt the parts together and allowing to cool causing fusion. Welding is distinct from lower temperature metal-joining techniques such as brazing and soldering, which do not melt the base metal. Many different energy source can be used for welding, including a gas flame, an electric arc, a laser, an electron beam, friction and ultra sound.

Electric arc welding was done to join the materials together. These permanent joins are strong enough to with stand the load and the vibrations during the operation.

Welding make the joins durable and strong.

4. WORKING METHOD

The working methodology of the machine is simple and easy to understand.

- For the dc motor power is supplied by means of recharchable batteries,the motor start rotating.
- Power is controlled by means of switch.
- The motor in turn rotates the crank wheel.
- The crank drive totates the free wheel by mans of chain drive.
- The driving roller touches the outer rim from inside and rotates the wheel.

5. SELF PROPELLED WHEEL

Fig: Front view of self propelled wheel

Fig: Top view of self propelled wheel

6. MERITS

- Machine work on the low power consumption (12v 4 amps).
- The operation of the wheel was well controlled.
- Well balanced system.
- Very low operating cost compared to gasoline powered vehicles.
- Fits for most of the cycles.
- Only simple support structures are required Design & fabrication is easy.
- It is an easy alternative.
- Initial investment is low
- Maintenance and repair cost are very low.
- It increases the safety and economical.

7. APPLICATIONS

- Self-propelled wheel can be used to convert any type of vehicle into electric an electric vehicle.
- This wheel can be used to convert a normal bicycle into an electric vehicle.
- It can be fitted to the handicap wheel chair and turns it into an electric propelled chair with low cost and effort.
- Can be used for daily commute in the city for work and for short fun ride.

8. CONCLUSION

While concluding this report, we feel quite fulfill in having completed the project assignment well on time, we had enormous practical experience on fulfillment of the manufacturing schedules of the working project model. We are therefore, happy to state that the in calculation of mechanical aptitude proved to be a very useful purpose. Although the design criterions imposed challenging problems which, however were overcome by us due to availability of good reference books.

The selection of choice raw materials helped us in machining of the various components to very close tolerance and thereby minimizing the level of balancing problem. Needless to emphasis here that we had lift no stone unturned in our potential efforts during machining, fabrication and assembly work of the printing or embossing machine project model to our entire satisfaction.

9. REFERENCE

[1] **R.S.Khurmi** and Gupta "Theory of Machine" Edition Reprint 2007.Page no. 106-107.

[2] R.S.Khurm**i** and Gupta "Machine Design" Edition 2005.Page no. 261- 280 and 558-570.