

E-TRIKE WITH FRONT AND REAR STEERING

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ABSTRACT

Tricycle is a vehicle with three wheels. Peoples are not using conventional bicycle in modern era because everyone loves sophistication and comfort. Considering all the facts and need we are coming with one sophisticated design which is having comfort, ease, stability, reliability and competence. This tricycle is a combination of ergonomics and aesthetic, but the question rises that all the tricycle are having this features then, what makes it different?

Tricycle is a conventional vehicle, which is use to cover short distances along the regular roots and transportation as well. As the technology predominates and produce high speed vehicles for travelling and transportation purposes. Resultant of all those activities is very useful but there by product was very dangerous and it start pollution. Now- a -days human transportation ways are switches on solar vehicles and green vehicles. Tricycle is one of the green vehicles which does not harm environment. Tricycle with front and rear wheel steering is the best way to control and reduce pollution. It is design for humans above 15 years. This tricycle consist of five features, which are length manager for managing overall length as per the height of person. Adjustable handle for manipulation of frontal balance. Suspension for the absorption of any shock. Front as well as rear steering for sharp, smooth and quick turns. Some special arrangements are there which will revolutionise the tricycle. This tricycle is having length manager, adjustable handle, suspension, front and rear steering. We had enjoyed conventional tricycle with front wheel steering but this tricycle having rear wheel steering also, which makes sharp turns and u-turns motile. Eventually the front and rear steering provides maneuverability and turning capabilities.

Keyword - Tricycle, Pollution, Transportation, Rear steering, Length manager, Adjustable handle, Green vehicle

1. INTRODUCTION

Energy demand is increasing due to ever-increasing number of vehicles employing internal combustion engines. Also, world is presently confronted with the twin crisis of fossil fuel deflection and environmental degradation. Fossil fuels are limited resources; hence, search for renewable fuels is becoming more and more prominent for ensuring energy security and environmental Protection but, it is very time consuming process. Non-renewable sources and electricity are the best options to fulfill demand. Now a day's cars, trucks and other utility vehicles are electrically operated due to which the use of gasoline, diesel and CNG (compressed natural gas) engine is being lesser day by day. After analysis of 10 years, scientist came to know that pollution due to automobiles could be manipulated only; if number of automobile goes down. So; using that research, we are trying to introduce a vehicle which is pollution free and works on electricity. There are a lot many vehicles which run with electricity but; there is no electric vehicle having low price and fun to people. This is the need of today's customers. To find substitute for present vehicles and to provide a cheap and full of fun vehicle we have designed "E-TRICYCLE WITH FRONT AND REAR STEERING". This tricycle is way more different in design as compare to conventional one. It is recumbent in nature and delta shape in design. Interesting to hear and fun to drive, as the name itself says that it is an E-tricycle means a vehicle with three wheels and electricity as a fuel. It also includes front and rear steering; which brings a cheery on a cake. Some fascinating arrangements for human comfort and stability are there to make this cake more tasty.

1.1 FEATURES OF TRICYCLE

Equipment, whether it be a workstation or clothing, must fit the user population. The user population will vary in size, and the equipment design must account for this range of sizes. There are three ways in which a design will fit the user:

a. Single Size For All - A single size may accommodate all members of the population. A workstation which has a switch located within the reach limit of the smallest person, for instance, will allow everyone to reach the switch.

b. Adjustment - The design can incorporate an adjustment capability. The most common example of this is the automobile seat.

c. Several Sizes - Several sizes of equipment may be required to accommodate the full population size-range. This is usually necessary for equipment or personal gear that must closely conform to the body such as clothing and space suits.[3][5] All three situations require the designer to use anthropometric data.

As per the above consideration and assumptions, we had managed to put single size with adjustment for several sizes. Following are the features of tricycle:

1.1.1 LENGTH MANAGER

Length manager is a simple sliding mechanism which manages the overall length of the tricycle. As tricycle is dealing with youngsters and elders, height will be the hinderance. Manipulation of tricycle is completely based on comfort of driver and to manage comfort we are using length manager. As per the consideration of ergonomics, every human being differs in size but having a same body anatomy. Average height of Indian men and women are 5ft 5 in (165cm) and 5ft (152) respectively. This information is based on a 2010 study by National Institute of Nutrition (Indian Council of Medical Research). In India, availability of vehicle is huge but most of the designers are using a 'minimum reach' method in which each and every driver have to adjust himself/herself as per the vehicle specification. There is no standard active vehicle in all over the world which will adjust itself as per the human specification in every aspect. Another facet of vehicles in India is vehicles are not pollution free, as every vehicle having engine in it. Gasoline, diesel, CNG (Compressed Natural Gas) these fuels producing carbon monoxide on huge rate, it's ok for heavy transportation but for small distances it wouldn't be good scenario.



Fig -1: Length manager

1.1.2. ADJUSTABLE HANDLE

In day to day life many among us face difficulties when it comes to reach somewhere which is at some height from ground surface. All automobile has a height to length ratio, used in every vehicle as per the standard of American society. We have discussed about the length of vehicle but, there is no vehicle which manages the length to height ratio from seating position to handle position. Many of us could not drive some vehicle just because that kind of problem occurs. To meet the solution of it we are moving towards adjustment which gives better comfort that is aesthetic and body position that is ergonomics. To support all those activities and to solve it, we have invented "Adjustable handle" as a height and distance from seat to handle position.

Adjustable handle has been placed on the front side of the tricycle on the traditional position. It is simple component that is made from 2mm thick plate having 4 inch diameter. By making to two symmetrical part of that plate we get two half circles. Half circle has straight line at the bottom, take one parallel line at 8mm above it and mark one center at the center line of the half portion.

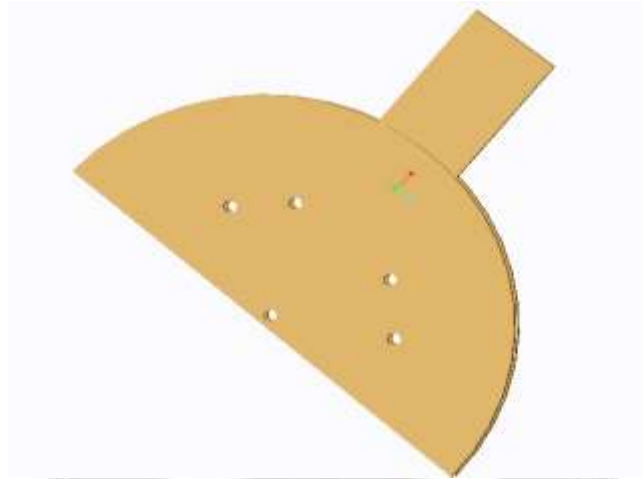


Fig -2: Adjustable handle

1.1.3 FRONT AND REAR STEERING

Steering for recumbent bikes can be generally categorized as

- over-seat (OSS) or above seat steering (ASS);
- under-seat (USS); or
- center steering or pivot steering.

OSS/ASS is generally direct—the steerer acts on the front fork like a standard bicycle handlebar — but the bars themselves may extend well behind the front wheel (more like a tiller); alternatively the bars might have long rearward extensions (sometimes known as Superman or King cycle bars). Chopper-style bars are sometimes seen on LWB bikes.

USS is usually indirect — the bars link to the headset through a system of rods or cables and possibly a bell crank. Most tadpole trikes are USS.

Center steered or pivot steered recumbents, such as Flevobikes and Pythons, may have no handlebars at all.[2][5]

In addition, some trikes such as the Sidewinder have used rear-wheel steer, instead of the more common front-wheel steer. They can provide good maneuverability at low speeds, but have been reported to be potentially unstable at speeds above 25 mph (40 km/h).

Front and rear steering is the newly added concept which brings fun, excitement but with precision. Many of the times it happens that, we are moving on the road with our respective vehicles and someone called us from back side that time we need to see in the mirror then, we took small degree turn to go across another side of the road and stop there. This long term process sometimes goes fast and accident happens because we are in hurry all time. To solve that kind of problem these kind of steering helps to take a quick turns on the spot.[6]

Steering is a process of turning vehicle with a steering setup. Front steering is the main and whole and sole of tricycle which always help to steer vehicle. In E-tricycle steering there is a attachment of adjustable handle. Tricycle has been design in delta form means one wheel at front and two wheels at rear side. It has a hub motor of 10 inch diameter in the hub of front wheel which is 16 inch in diameter. Every delta models face one problem in steering that is it goes to one side thrust for the first time users, ones they used to with it they feel comfortable.

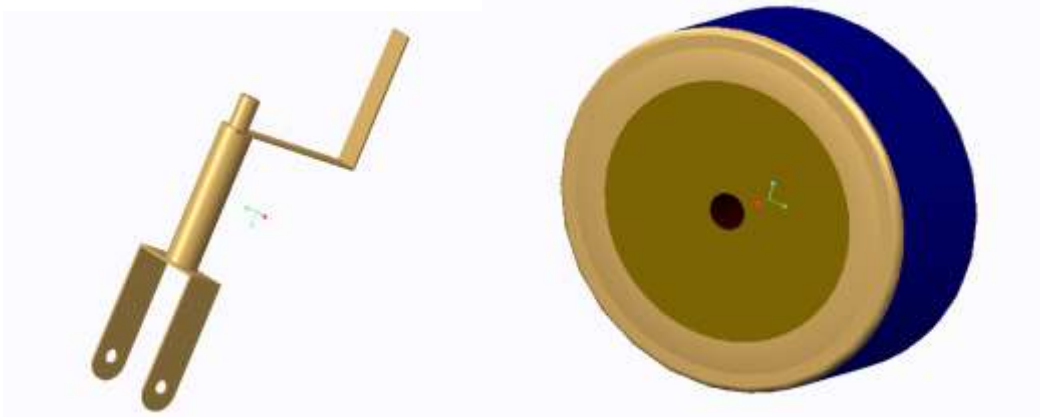


Fig -3: Front and rear steering

1.1.4 ELECTRICAL SETUP

Now- a-days many machines are automated due to inefficient quality and quantity of workers, that leads to perfection and increase in any kind of work. Most of the machines does need power to drive another component, so to generate power we need engine or motor. Engine consumes fuel and produces some environment unfriendly gases which affects environment and increases pollution. Motor works same as engine but it consume electricity which do not support pollution and that why motor is the best replacement for engine.

Principle that have mentioned in above paragraph pushing us towards the use of batteries that is electricity. As per the need of motor, battery selection taken places. To convert tricycle into E-tricycle we have used hub motor of 250 watt 48volts. Hub motors are very easy to assemble because of its shape and design. It directly fits into hub of wheel and look like a disk. Hub motor of 250 w and 48 volts need batteries of 48volts and 7Ah that has limitations because use of dry battery or gel battery become more tedious job as compare to lithium ion batteries. Dry gel battery has 7 kg weight per battery.



Fig -4: Battery and hub motor

2. ANSYS REPORT

Material selection is the most exciting and important process in any kind of manufacturing or fabrication. Every material has certain properties which gives reliability, strength, resistance and further more qualities to the respective product. It is particularly based on the load and other factors which are responsible to affect material. This has to be understood with some analysis software. We have selected three materials for fabrication purpose viz. aluminium alloy, carbon fiber and mild steel:-

Mild steel is a steel having low amount of carbon. It is actually known as “Low carbon steel”. Less carbon means that mild steel is typically more ductile, machinable and weldable than high carbon and other steel. It also has high amount of iron and ferrite, making it magnetic

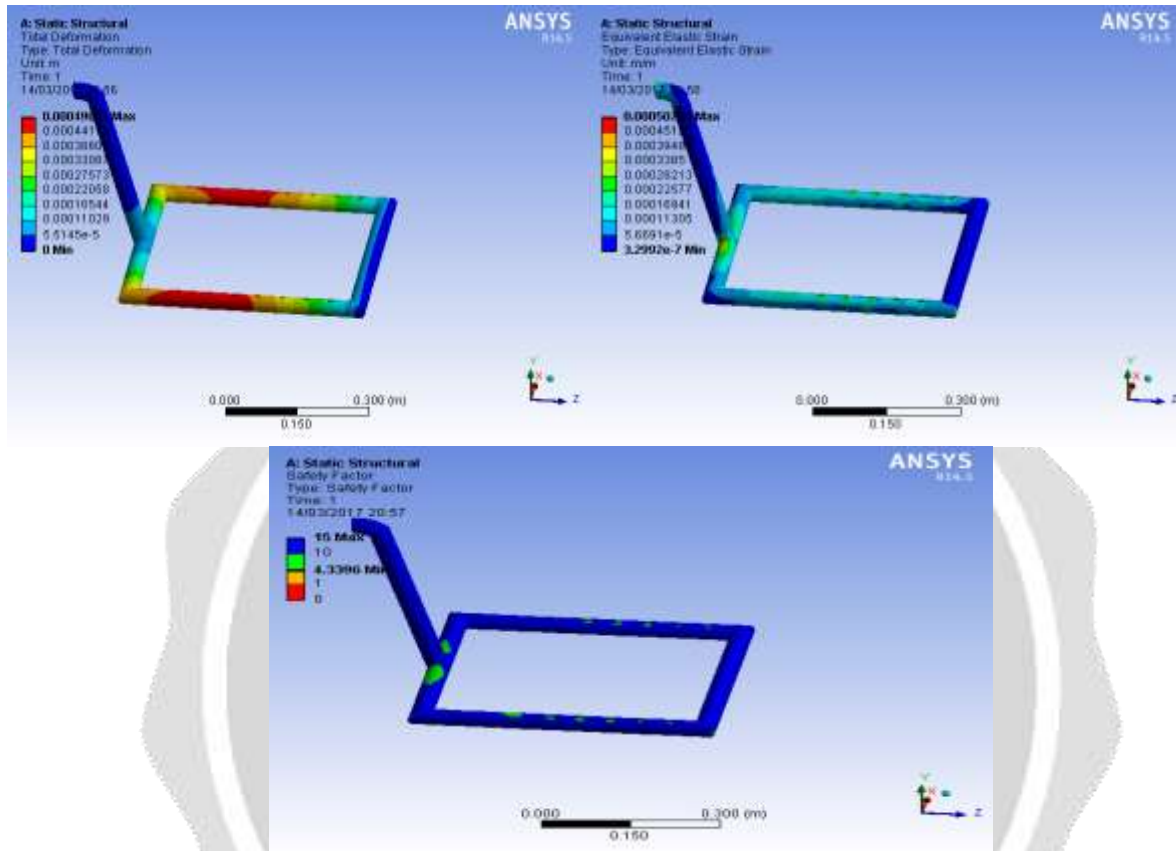


Fig -5: Mild steel ansys report

3 FUTURE SCOPE

Now that we have come this far in our project, the next thing that has to be done is to do enough testing to be able to accurately evaluate the reliability of our design. We should make sure that the tricycle can handle abuse and inclement weather. Further weather proofing of the battery box, motor controller, and joystick needs to be considered and implemented.

- 1) In future we can use flexible seating arrangement.
- 2) In this tricycle we can use high power motor.
- 3) We can use suspension system.
- 4) This tricycle is very flexible and can be modified according to once interest.
- 5) In future, we can use this tricycle for any kind of human being.

4. CONCLUSIONS

Now a day's in the modern world of adulteration, every human body needs comfort and techniques to be alive otherwise bad postures and position will directly affects human body and disturb each and every muscle, which affects reliability; means life span of any human. To avoid that kind of abnormalities, we need to change daily

habits. Developed root of automation in India is very fast and helpful to everyone but, on the other hand human beings are getting more and more lazy. Only 20% people follow their day after yoga but what about the 80% peoples. This abnormality has to be solved.

Tricycle with front and rear steering is one of the best option to replace fuel based vehicles. It includes hub motors which basically run on electricity due to which fuel utilization would be vanished. Replacement of fuel engines with motor is the best solution to reduce pollution. Two out of three household has two wheelers, which brings India in the list of “Highest Consumer of two wheelers” that means a use of two wheelers is more in India. The solution of all those problems may be the e-tricycle with front and rear steering. It is a recumbent tricycle hence comfort is the biggest advantage that rider gets all the time. Fun to drive because of electricity that means no need to pedal it, on the same time if anyone wants to pedal then there is a chain drive. Length manager manages length any make it flexible for any anatomy. Adjustable handle functions in two ways, in order to manage distance and the angle of handle which means great comfort of body with better dynamics. Handicaps that don't have legs, E- tricycle can be their legs to walk all over the ether without small effort. So, it is useful to everyone for any purpose.

We concluded that E-tricycle with front and rear steering is one of the future tricycle that would help to manipulate environment abnormalities and can be multi-purpose vehicle.

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