DESIGN AND FABRCATION OF TRIKE-ME TRICYCLE

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Abstract

The Trike-Me tricycle offers an alternative mode of transportation compared to traditional tricycles. This work deals with using design that uses hand pedals to propel the tricycle forward and for steering the tricycle left or right. The configuration of the tricycle is a recumbent design, meaning that the rider's body is oriented in a horizontal position. When a rider will turn the hand pedal on one side, the tricycle will turn in that direction. There are brakes located next to the seat. There is one brake on each side of the rider. The brakes are separate system designed as a failsafe in the unfortunate event if one brake fails. The tricycle has necessary lights and reflectors to meet safety regulation. These lights also aid in visibility not only for the rider, but also for other vehicles on the road.

1.Introduction

In today's market, there are a vast range of manufacturers of both upright and recumbent tricycles Even though many manufacturers produce upright and recumbent tricycles for disabled people, no current manufacturer makes one that can fully satisfy a disabled person's needs. When starting our research, we noticed that there are wide ranges in styles of tricycles. The model styles offered in today's market range from a sleek and light model intended for long road rides to large and bulky frames which are intended for off-road riding. We decided to focus our research towards a more comfortable and affordable style of tricycle.

The objective of this project is to design and build a hand paddled tricycle for those with little or no use of their legs. We wanted to design and manufacture a cost-effective tricycle attachment for easier accessibility and increased performance to the wheelchair users. The specific goals that pertain to this objective are ease of use, speed, safety and outdoor usage. A lot of work has been done in this particular area. Dul and Weerdmeester[1], in his work discussed the length of the person's reach and state that he or she should only reach within a radius of 50 centimeters of the original location where the width of the forward and sideways reaches must be limited to prevent bending or twisting the trunk. Kroemer, Kroemer, and Kroemer-Elbert[2], in his work, discussed the location of the arm and the elbow joint greatly affects the maximum force produced by the various motions.

2. Construction

The tricycle construction had two stages. First, the frame was constructed from different steel materials, such as square tubing and angle iron. It involved mainly cutting and welding the metal. Second, the more complicated parts of a conventional bicycle were collected and reassembled to become part of the hand-powered tricycle. The first stage was relatively straightforward although it required. We did a lot of operations while constructing this cycle like the shaft we have used for connecting the two rear wheels was very long, so we had to cut it according to our need and then perform operations like turning, threading, etc. on it using Lathe machine. All the cutting was done using hand power cutting tool and all the welding was done using arc welding process. We required a shaft connecting two rear wheels to be stationary because we wanted to weld the frame on it, for this purpose we have used 2 bearing on in wheel so that it rotates independently of the shaft.

2.1 Testing

Testing the tricycle was an easy task. The first order of testing was the brakes. The initial test was done by lifting each wheel with a brake mounted to it and spinning them. This not only allowed for less risk in checking the function of the brakes, but also allowed us to check to see if anything was there that could cause damage to the moving parts. After we did a brake test, we checked the steering. The steering was checked by ensuring that the wheels turned as much as the design would allow. After the initial tests were done, the group rode the tricycle for an all systems test. This test included braking, turning at high speeds, up and down hill and anything else in between. The test performed as anticipated. Turning at high speeds can be problematic; the brakes were easy to reach and had great stopping power. The group was able to verify or validate each project requirement.

2.2. Ease of Use

2.2.1 Timing transfer and positioning on trike

The team timed team members getting in and out of the trike. The results for this can be seen in Table 2. The team's goal was to have someone able to do the full transfer by themselves in less than 5 minutes.

User	Loading Time (min)	Unloading Time (min)	Total Time (min)
Team member acting as paraplegic	2:01	1:04	3:05

Table 1 shows the Loading and unloading times

2.2 Safety

Braking distance is a key measure that the team thought was very important for safety. To measure this, a tape measure was laid out on a flat road. A team member (able body male) got to top speed before the tape measure. Brake handle was enabled when the rider got to the tape measure, and the distance to stop was measured. Results of this can be seen in Table 2.

User	Braking distance from top speed (ft)
Team Member (able body male)	4 ft. 8 in
Team Member (able body male)	5 ft. 8 in
Team Member (able body male)	5 ft.
Average	5 ft. 1 in

Table 2 shows the braking distance from top speed

3. Design and Results

The tricycle was a success. We were able to design and construct a hand pedaled tricycle without deviating from our goal. We designed a tricycle that is lighter in construction, simple in design, easy to use and cheap to buy. We got a positive feedback from the people who used it and were impressed by its unique design. There was no problem encountered while driving the tricycle. All the tests performed on it were successful. We were glad to see the results of the tests as they were fulfilling our requirements. The design of the tricycle was made using SolidWorks software. The designs of the parts are as follows:

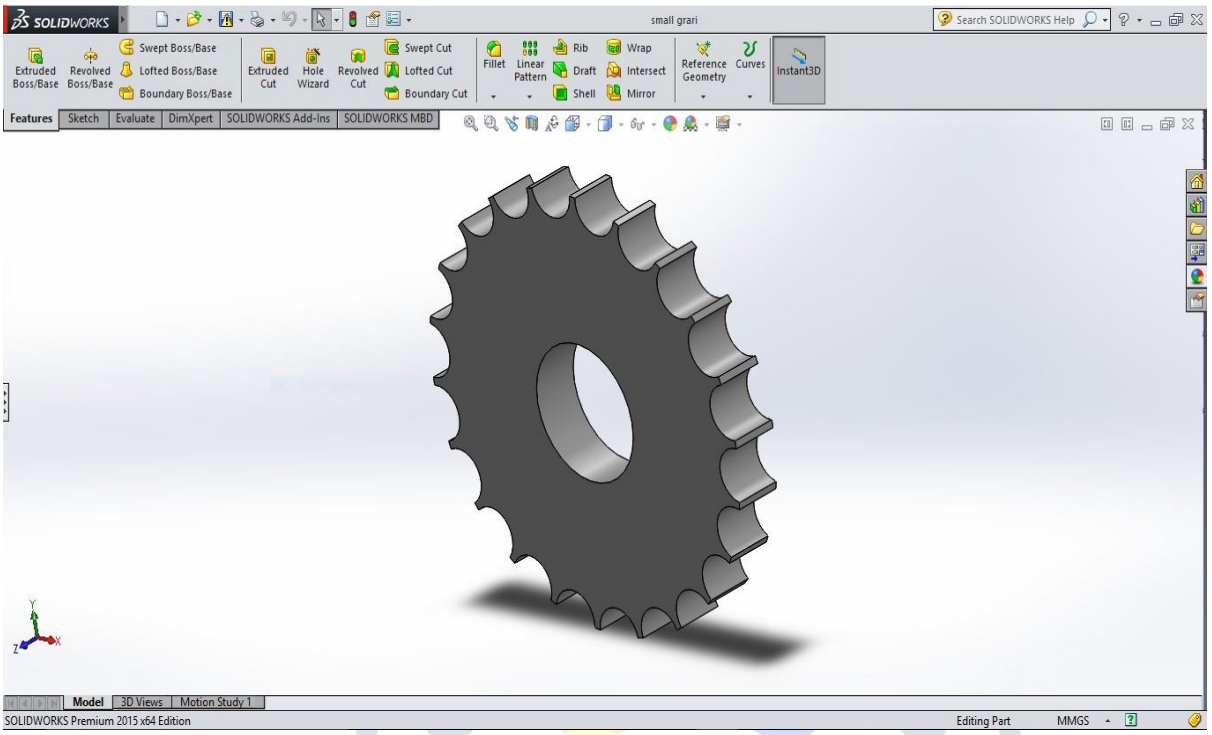

Fig.1 Design for gear

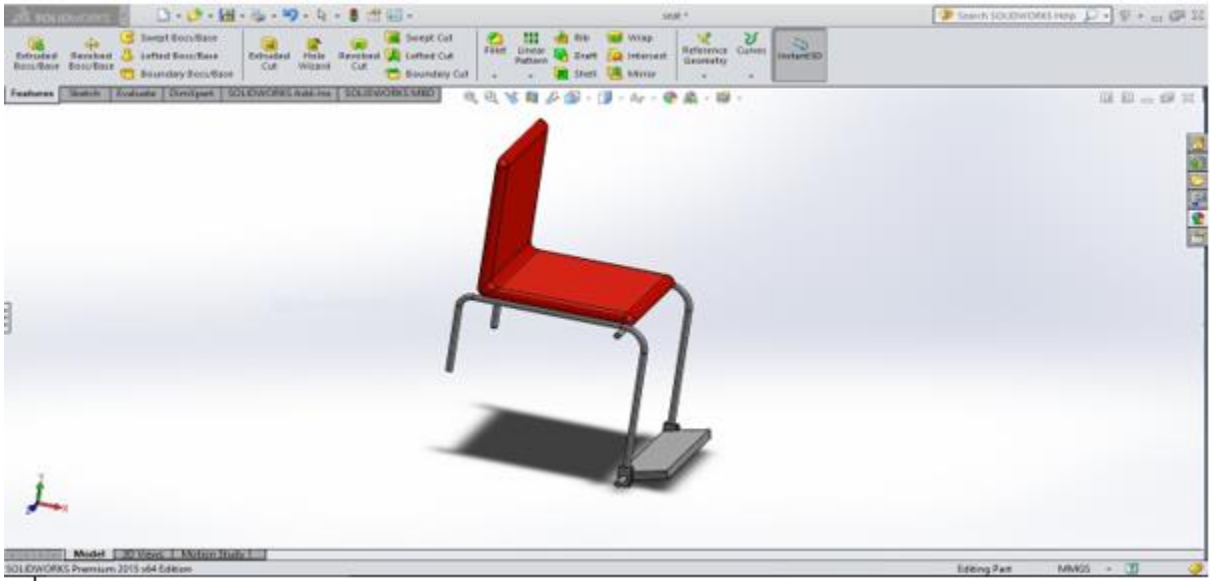

Fig.2 Design of Chair

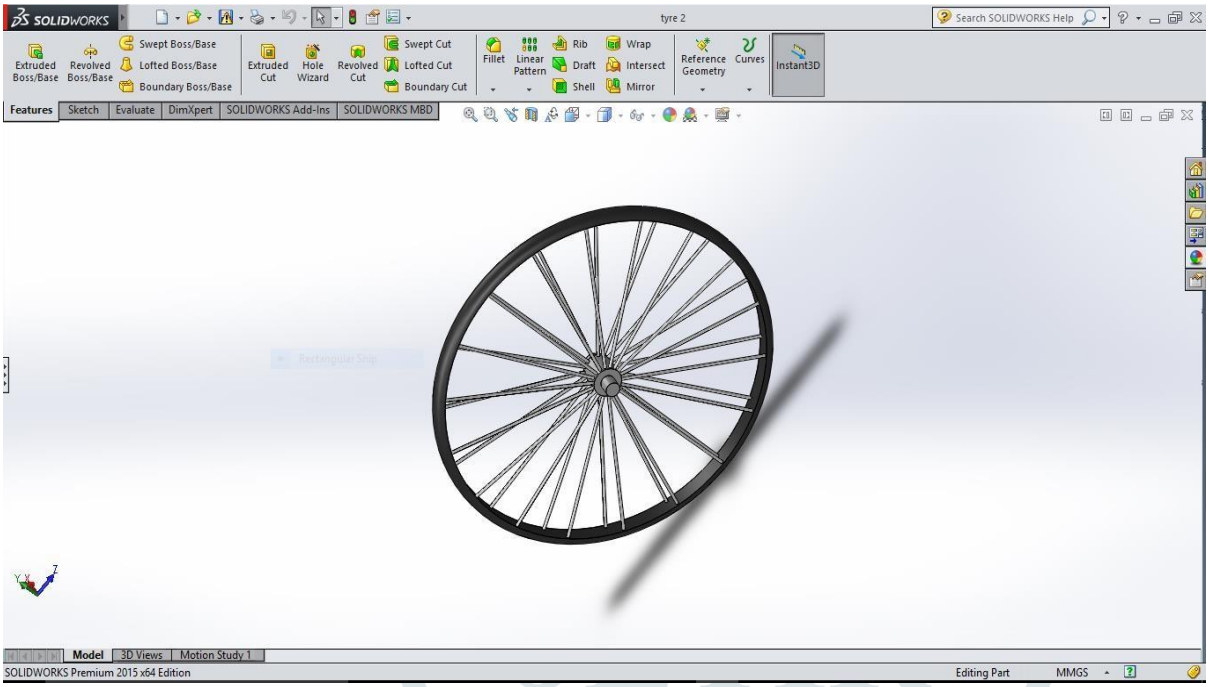

Fig.3 Shows Tyre design

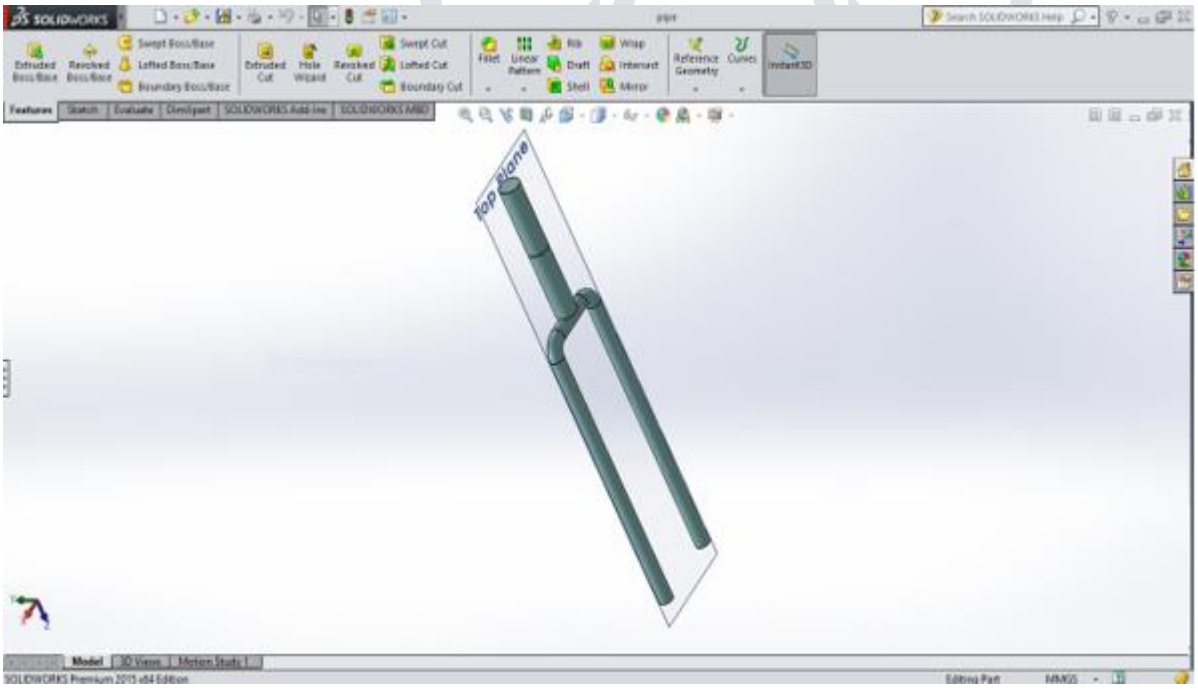

Fig.4 Shows Trike me design

Fig. 5 shows the Tricycle

4. Future Scope

There is a lot of scope for the work such as the tricycle can be easily made electrical by using a battery and a motor and by doing some small modifications in the design battery and motor can be easily installed in the tricycle. The tricycle can be made solar also. The solar panel can act as a roof of the tricycle; this will give shade to the rider and will also keep him dry in rain. But this will increase the overall cost and weight of the tricycle. A lighter material can be used in the future so that the overall weight of the cycle is reduced. Most of the tricycles for handicapped people are of upright type. Work can be done in the future to create a recumbent tricycle for handicapped people.

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