

DESIGN AND FABRICATION OF TREADMILL BICYCLE

PROJECT REFERENCE NO.: 41S_BE_0688

COLLEGE : V.S.M. INSTITUTE OF TECHNOLOGY, NIPPANI
BRANCH : DEPARTMENT OF MECHANICAL ENGINEERING
GUIDE : Prof. PRASHANT S. SHEDBALKAR
STUDENTS : Mr. PRAVEEN B VIJAYANAGARE
Mr. AJIT S KITTURE
Mr. AKSHAY B YADAWAD
Mr. KUMAR KOLEKAR

Introduction:

Bicycles are one of the most ubiquitous forms of transportation in the world. Most children remember their first bike; with it came the chance to explore their world with more freedom than ever before. As we grow, however, bicycling becomes more than just a childhood rite of passage. Wind in our hair and feet on the pedals, we have several good reasons to climb on and take a trip. This version of the e-bike has a small motor mounted on the back wheel to double the power +500,000 units worldwide, making Japan the e-bike market leader. The European market is growing as well, with more than 100,000 units sold in 1999.

The mechanism used in solar health cycle is versatile of its kind in which, the cycling pedals are replaced a treadmill belt. The prototype design requires an treadmill belt, shafts, the frame of treadmill, the freewheel gears, chain drive and gear chain .The platform on which the treadmill belt is placed is fabricated. All the links are made up of normal MS (mild steel) including the head which has a direct contact with the treadmill belt. The system is expected to move as heavy weights up to 150 KGs approximately. The aim of the project work is to design and fabricate a solar walking cum cycle mechanism that makes much easier to move. People from one place (section) to the other even while processing in the factories, industries, etc.

Exercises are advised for health promotion, and prophylaxis for many cardiovascular diseases and also for rehabilitation after an episode of disease. Among the exercises aerobic exercises are appropriate for these purposes. To do aerobic exercise many methods are available for example: running, jogging, walking cycling and others. Among different modes of exercises in the modern busy life, the cycling and treadmill exercises are the commonest to perform as indoor aerobic exercises. In solar powered motor driven treadmill exercise which is similarly to walking or jogging or running depending upon the speed of the treadmill motor is becoming more familiar to all. Thus we made an innovation to take that treadmill in park. This is nothing but having a walk in a park. The electric bicycle (e-bicycle) market varies greatly by product type and regional demand. The placement of electric motors for e-bicycles is also receiving increased consideration. E-bicycle can have motors in one of three locations: The rear wheel hub is the most popular location, and most of the large Chinese market and american as well as european markets is utilising rear hub motors. The mid-mount motor is the fastest growing segment, in part due to strong competitors like Panasonic and relatively new competitors including Bosch treadmill belt and then the belt turns moving the person in required direction.

Objective:

1. The solar powered health cycle is totally new gateway in transportation.

2. The solar powered electrical assistance it take a very minimal effort to walk than "a walk in park".
3. By this the rise in pollution can be greatly minimized and also make people exercise while they travelling to various destinations.
4. It is totally work on the non conventional energy source.

Literature Survey

Present modern day world, there are two main issues which are causing trouble for mankind is the global warming which is caused by extensive use of combustibles and automobiles even for short distances also. Due to this there is an immense effect on environment and also depletion of fuel sources. The second concern is that lot of people are now majorly suffering from novice health issues. This is because lack of proper exercise. so i came up with the new pioneering idea in modern transportation world and named as solar powered health bicycle which can make people walk while they ride.

"Physical activity," "exercise," and "physical fitness" are terms that describe different concepts. However, they are often confused with one another, and the terms are sometimes used interchangeably. This paper proposes definitions to distinguish them. Physical activity is defined as any bodily movement produced by skeletal muscles that result in energy expenditure. The energy expenditure can be measured in kilocalories. Physical activity in daily life can be categorized into occupational, sports, conditioning, household, or other activities. Exercise is a subset of physical activity that is planned, structured, and repetitive and has as a final or an intermediate objective the improvement or maintenance of physical fitness. Physical fitness is a set of attributes that are either health- or skill-related. The degree to which people have these attributes can be measured with specific tests. These definitions are offered as an interpretational framework for comparing studies that relate physical activity, exercise, and physical fitness to health. A new continuous treadmill protocol (USAFSAM) has been designed using a constant treadmill speed (3.3 miles/hour) and regular equal increments in treadmill grade (5 percent/3 min). The constant treadmill speed requires only initial adaptation in patient stride, reduces technician adjustments and produces less electrocardiographic motion artefact than do protocols using multiple or higher treadmill speeds, or both. The regular equal increments in treadmill grade are easy to implement and provide a larger number of workloads than do protocols that are discontinuous or require larger changes in work load.

Dr Swapnali Ravikiran Kisan MD, Dr Anitha OR MD & Dr Chandrakala SP MD, Trademill Bicycle is one type of bicycle in which a man walks on the trademill and then trademill moves backward. This motion of trademill accuates the electric motor and motor rotates the shaft of rare wheel using chain drive and battery. The motion of trademill bicycle is depend upon the human efforts so it is also called as walking bicycle. In multipurpose trademill bicycle we are going to attach a reciprocating pumpforpumping the water. Reciprocating pump pressurise water. Multi prurpose trademill bicycle consists the parts like wheels, trademill, battery, dc motor, chain drive, reciprocating pump.

A. L. Schwab. "Experimental validation of the lateral namics of a bicycle on a treadmill." Trademill Bicycle treadmill bicycle can be used in place of regular bike at cheaper cost and without use of fuel. The treadmill bicycle will proof to be a future vehicle as no fuel is used for travelling through this and it is pollution free. The treadmill which is used for walking helps to keep us fit as exercise is also one of the important tasks for a person to be fit a d healthy for day to day

life. Treadmill is cheaper than the normal bike which also makes it efficient and in this treadmill bicycle we can use reciprocating pump for giving water to plant and gardens as well as this can be use for transportation purpose also.

Working Of Treadmill Bicycle

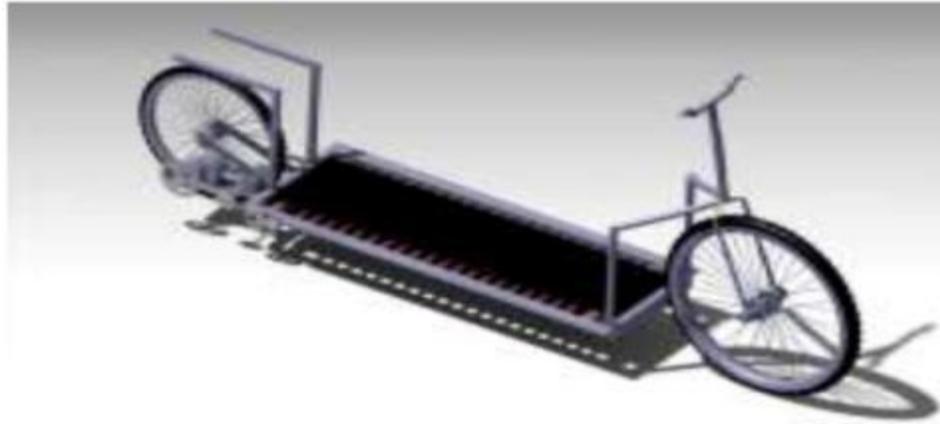


Fig 3.1 mechanical design of treadmill bicycle

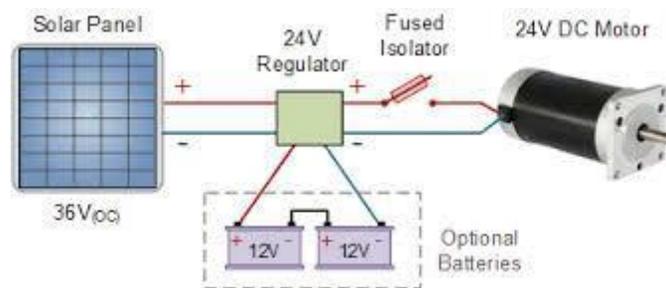


Fig 3.2 system design of treadmill bicycle

The working of the treadmill cycle is as follows; they are four stages of working mechanism, in the first stage the solar panel play a key role, as we are running on solar energy, the sun rays contains of photons come and directly hits the solar panel which consists of schematic arrangement of solar cells, convert the photons into electrical energy using photovoltaic effect. The second stage consists of charge controller, voltage regulator, battery, in which the electrical energy from panel is in form of uncontrolled stage which in turns convert it into controlled state and voltage regulator regulates the voltage i.e; input voltage is converted into higher regulated voltage and stored in sealed lead ion battery of suitable amp power. In the third stage the energy stored in battery is the passed through the DC-DC boost converter and is then supplied to the brushless direct current motor which contains a permanent magnet and provides high torque and smooth noiseless operation which is fitted into the rear end of the cycle. Finally in the fourth stage, the sprocket and chain drive mechanism takes place. The power from motor is then transferred to the tread mill belt connected to the couple of rollers in front and rear of belt through sprocket and chain which is fitted in the rear end off the wheel and weight, easily available, cost is less and also having a smooth surface finish which gives smooth motion of belt on the surface of supporting rollers.

Material Selection

The materials used in this project are detailed as follows:

- Mild Steel.

- Nylon rubber fabric.
- PVC (polyvinyl chloride).

Mild Steel: The frame of treadmill and front & rear rollers are made up of mild steel.

Reasons: Easy availability.

It has good mechanical properties.

Nylon Rubber Fabric:

Standard material available for tread belt is nylon fabric. So we use this material for treadmill belt. Nylon rubber fabric is cheap and easily available, less in cost & having property of wear resistance.

PVC (Polyvinyl chloride):

PVC pipes are used as a supportive roller in treadmill frame. PVC pipes are used because those are light in weight, easily available, cost is less and also having a smooth surface finish which gives smooth motion of belt on the surface of supporting rollers.

Methodology:

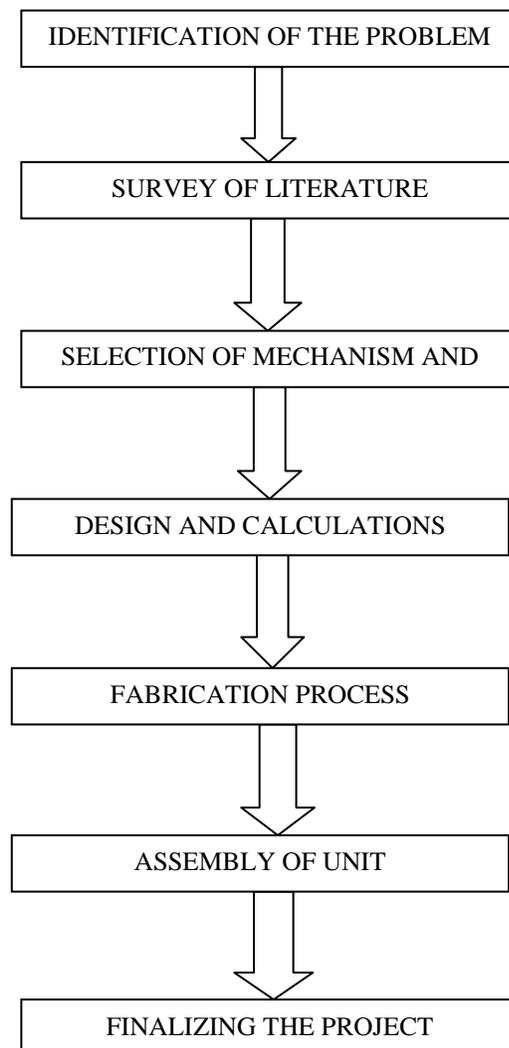


Fig. Methodology chart

Design Of Treadmill Bicycle

In our attempt to design a walking bike, we have adopted a very careful approach. Total design work has been divided into two parts mainly,

- 1) System Design.
- 2) Mechanical Design.

System design mainly concern with the various physical concern and ergonomics, space requirements, arrangement of various components on the main frame of treadmill, arrangement of tread belt and rollers, position of braking system, arrangement of motor, sprockets, ease of maintenance, scope of further improvements, ground clearance etc. In mechanical design, the components are categorized into two parts.

- 1) Design Parts.
- 2) Parts to be purchased.

For design parts, detailed design is done and dimensions thus obtained are compared to next highest dimensions which are readily available in the market. This simplifies the assembly as well as post production servicing work. The various tolerances on work pieces are specified in the manufacturing drawing. The process sheets are prepared and passed on to the manufacturing drawing. The process sheets are prepared and pass on to the manufacturing stage. The parts are to be purchased directly are specified and selected from standard catalogue.

Expected Outcomes of The Project

- 1) Solar powered treadmill bicycle is modification of existing walking bicycle.
- 2) In this we have made a shear modification of treadmill and cycle running through solar assisted energy, which is a non-conventional and renewable energy.
- 3) It has also played a predominant role in global warming and also took up some part in fuel less transportation method.
- 4) It is completely eco-friendly and emission free with no running cost and less maintenance.
- 5) This cycle can be an adaptable mode of transportation for rural and urban areas.

Application Of The Project

- 1) It is used for health purpose and travel from one place to another with less effort.
- 2) It does not require any fuel.
- 3) It is an eco friendly vehicle.
- 4) It is used for travelling over short distance.
- 5) Treadmill bicycle helps in maintaining proper physique and fitness.
- 6) It is also used for gym purpose.
- 7) Maintenance cost is less.

Reference:

Journal References

- 1) **International Journal on Research Innovations in Engineering Science and Technology(IJRIEST)**
Volume2, Issue 5, May-2017
- 2) **International Journal of Engineering Science and Computing**, April 2017

3) **International Conference on Ideas, Impact and Innovation in Mechanical Engineering**

Volume: 5 Issue: 6