



FABRICATION OF A FOLDABLE MOBIK

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ABSTRACT

This project-foldable Mobike is developed to make the automobile a more Eco friendly vehicle and to reduce the problems of parking. It consumes less fuel when compared to other ordinary bikes available. This bike is more useful at the time of breakdowns, The Provisions are made in such a way that the bike can be folded and an arrangement of a link helps to fit this folded bike like a trolley which can be rolled anywhere.

The folding mobike originally developed for the use in times of breakdowns, traffic jams etc., and since it is portable it can be carried on top any place. This type of bike consists of mainly a folding arrangement and a folding suitcase. This has vast applications by superseding the disadvantage of an ordinary bike.

Keywords — foldable mobike.

I. INTRODUCTION

Maybe the turn of the century ought to be a few years away. But properties like fast depleting oil resources, ever increasing traffic snags, problems of parking and the need to make the automobile a more environment friendly vehicle, designers are back drawing boards, trying to hit upon a novel concept that will completely alter the conventional design. This prompted us to make a bike with certain modifications and development.

In the present day lifestyle man is not able to dedicate specific time for his health, importance is least given to exercise and body fitness due to time shortage and stressful life. Obesity is one of the common issues seen in the society, which leads to many health hazards. Exercises are advised for health promotion, and treatment for many diseases. 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.

II. MATERIAL SELECTION

Next was the selection of suitable material for the frame. It was important to make the frame sturdy, yet light. After long sessions of discussion it was finalized to use the standard material used in conventional bicycles i.e. Mild steel. Mild steel is easily available in the required diameter and length and is also not expensive. One main advantage of using mild steel is that it is easy to fabricate with it as welding of mild steel is by arc welding process which is cheap compared to other welding methods. Use of other materials like alloys of aluminium was not selected as the availability is less and also the fabrication cost is high. Mild steel tubes of 1", 1.5", 0.5" are easily available in the market and are the ones used for conventional bicycle manufacturing. The hinge found in the market is also made of mild steel which eases the process of joining the frame to the hinges. The following are the chemical composition and mechanical properties of mild steel

A. CHEMICAL COMPOSITION:

Carbon 0.16-0.18%

Silicon 0.40% max

Manganese 0.70-0.90%

Sulphur 0.040% Max

Phosphorus 0.040% Max

B. MECHANICAL PROPERTIES:

Max Stress 400-560 n/mm²

Yield Stress 300-440 n/mm² Min 0.2% Proof Stress

280-420 n/mm² Min Elongation 10-14% Min

Young's modulus 210 Gpa.

III. MANUFACTURING PROCESS

Manufacturing processes are the steps through which raw materials are transformed into a final product. The manufacturing process begins with the creation of the materials from which the design is made. These materials are then modified through manufacturing processes to become the required part. Manufacturing processes can include treating (such as heat Treating or coating), machining, or Reshaping the material. The manufacturing process also includes tests and checks for quality assurance during or after the manufacturing, and planning the production process prior to manufacturing.



Fig no 1 Manufacturing Process

IV. COMPONENTS AND DESCRIPTION

A. GEAR WHEEL: A gear or cogwheel is a rotating machine part having cut teeth, or cogs, which mesh with another toothed part to transmit torque. Geared devices can change the speed, torque, and direction of a power source. Gears almost always produce a change in torque, creating a mechanical advantage, through their gear ratio, and thus may be considered a simple machine. The teeth on the two meshing gears all have the same shape. Two or more meshing gears, working in a sequence, are called a gear train or a transmission. A gear can mesh with a linear toothed part, called a rack, thereby producing translation instead of rotation.

When two gears mesh, if one gear is bigger than the other, a mechanical advantage is produced, with the rotational speeds, and the

torques, of the two gears differing in proportion to their diameters.



Fig. no:-2 GEAR WHEEL

B. Seat: A seat is a place to sit, referring to the area sat upon as opposed to other elements like arm rests. A seat is also known as a bench, a chair, a chaise longue, chesterfield, a couch, a davenport or a settee.

C. Wheel: A wheel is a circular component that is intended to rotate on an axle bearing. The wheel is one of the main components of the wheel and axle which is one of the six simple machines. Wheels, in conjunction with axles, allow heavy objects to be moved easily facilitating movement or transportation while supporting a load, or performing labour in machines. Wheels are also used for other purposes, such as a ship's wheel, steering



Fig. no:-3 WHEEL

D. BEARING: A bearing is designed to: Reduce friction, Support a load and Guide moving parts – wheel, shafts, pivots



Fig no. 4 BEARING

E. CHAIN DRIVE: the power is conveyed by a roller chain, known as the drive chain or transmission chain, passing over a sprocket gear, with the teeth of the gear meshing with the holes in the links of the chain. The gear is turned, and this pulls the chain putting mechanical force into the system.



Fig. no :-5 CHAIN DRIVE Fig, no:-6 SPROCKET

F. DC MOTOR: A DC motor is any of a class of rotary electrical machines that converts direct current electrical power into mechanical power. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills. The advent of power electronics has made replacement of DC motors with AC motors possible in many applications.



Fig no. 7 DC MOTOR

G. Solar panels: Solar panel refers to a panel designed to absorb the sun's rays as a source of energy for generating electricity or heating. A photovoltaic (PV) module is a packaged, connect assembly of typically 6×10 photovoltaic solar cells. Photovoltaic modules constitute the photovoltaic array of a photovoltaic system that generates and supplies solar electricity in commercial and

residential applications. Each module is rated by its DC output power under standard test conditions (STC), and typically ranges from 100 to 365 watts. The efficiency of a module determines the area of a module given the same rated output – an 8% efficient 230 watt module will have twice the area of a 16% efficient 230 watt module. There are a few commercially available solar modules that exceed 22% efficiency and reportedly also exceeding 24%. A single solar module can produce only a limited amount of power; most installations contain multiple modules. A photovoltaic system typically includes an array of photovoltaic modules, an inverter, a battery pack for storage, interconnection wiring, and optionally a solar tracking mechanism.



Fig no. 8 Solar Panel

IV. WORKING PRINCIPLE

Once the bicycle frame was fabricated with reference to the design, it was practically tested to check if any bending was observed near the hinges. It was found that there was a considerable bending in the front portion of the frame. The figure shows the region where the bending was experienced. As this was one major problem to be dealt with, a slight modification had to be done on the frame.

It is the mechanism which transmits the power from Motor to rear wheel. A bicycle chain is a roller chain that transfers power from the Motor to the drive-wheel of a bicycle, thus propelling it. Most bicycle chains are made from plain carbon or alloy steel, but some are nickel-plated to prevent rust, or simply for aesthetic. Before the safety bicycle, bicycles did not have chains and the pedals were typically attached directly to the drive-wheel, thus limiting top speed by the diameter of the wheel and resulting in designs with front wheels as large as possible. Various linkage mechanisms were invented to raise the effective gear ratio, but with limited success. Using chain drive allowed the

mechanical advantage between the drive and driven sprockets to determine the maximum speed. It is the setting arrangement in the bicycle. The Saddle, Undo the lever, push the saddle right down, and re-clamp the lever. During this action, it is because of this that the rear frame remains folded, in turn retaining the front wheel in its folded position. So if you do not push the saddle fully down, it is possible for the folded package to come apart when you pick the bike up. Folding pedal, It is best to fold this with the left hand crank as high as possible i.e. with the cranks turned so that the right hand pedal touches the front wheel also, the ridged side of the nylon latch plate on the pedal should face upwards. This is the arrangement used in the bicycle which is use for the carrying the bags or any kind of things on carriage we have to fixed it first on the carriage.

A folding bicycle with a compact frame comprising a front portion and a rear portion. The front and rear frame portions are connected by a hinge structure which permits the front frame portion to be rotated about the vertical axis of the hinge structure to a position against the rear frame portion for easy carrying or for insertion into a carrying bag. The folding bicycle is provided with a folding handlebar assembly which can be quickly adjusted from a standard ten speed driving configuration to a more relaxed touring handlebar configuration, or to a fully collapsed compact carrying position. The folding bicycle is provided with an adjustable soft ride seat, and with pedals which are reversible to reduce the overall width of the collapsed bicycle. The folding bicycle shown in the accompanying drawings has a front wheel assembly comprising a front wheel mounted on a fork above which is mounted a pair of handlebars each of which can be folded downwardly to lie alongside the wheel. Each handlebar has a tubular portion extending into a sleeve of circular cross-section carried above the fork so that it can pivot within the sleeve relative to the fork and front wheel. In the unfolded position a stop mounted on the fork and located between the pivots of the handlebars prevents them from moving towards one another beyond the position shown in the Fig. and the handlebars are held in this position by a link. The link is hooked at one end and flexibly secured at its other end to one of the handlebars.

The hooked end of the link can be hooked to the other handlebar so as to extend between them, the length of the link being such that the handlebars are flexed slightly towards one another in order to provide rigidity to the handlebars when they are unfolded. Unhooking the link allows the handlebars to be folded downwardly. The pivoting axes of the two handlebars are arranged to converge slightly in the forward direction so that, when unfolded, the hand grips are slightly splayed outwardly for the comfort of the rider of the bicycle and so that, when folded the grips be substantially parallel to the front wheel. The front wheel assembly including the handlebars and wheel pivot about a conventionally inclined steering pivot carried in the front part of a main frame member, the front part being pivoted to the rear part of the main frame at. The pivot comprises a tubular portion on the front part received within a cylindrical portion on the rear part so as to be capable of rotation therein. The pivot is provided with a releasable clamping mechanism which frictionally clamps the two parts against relative pivoting and which will be described in greater detail hereinafter, the clamping mechanism enabling the parts to be clamped relative to one another in both the erect and the folded condition of the bicycle. The rear end of the part carries a tubular seat support member in which is received a tubular seat strut which in turn receives a seat post carrying a saddle. The height of the seat can be adjusted by sliding the post in the strut and then clamping it with a clamp. The saddle support strut is also slid able relative to the saddle support member and can be clamped relative to the latter by a clamp. At its lower end the saddle support member carries a horizontal pivot about which a rear wheel frame in which the rear wheel is mounted can pivot during folding and unfolding of the bicycle. It will be appreciated that this pivot is located below and behind the axis about which the chain wheel of the bicycle rotates; the importance of this will become apparent when the operation of folding the bicycle is explained hereinafter. The chain wheel is provided as usual with pedals and the left hand pedal can also be folded so as to make the bicycle in its folded configuration as compact as possible.

A. ORIGINAL VIEW OF PROJECT



Step 1:- The handle can be folded either front side or Back Side



Step 2:- In the middle of the Bike this can be folded as shown in fig.



Step-3:- The Seat is folded to the forward direction



Step 4:- After Folding the bike, the View is shown in fig



Fig.no.9 The Final view of a FOLDABLE MOBIKE

ADVANTAGES: No Fuel cost, No pollution & No fuel residue, Easy starting, Less wear & tear because no reciprocating part, Lubrication is not necessary
DISADVANTAGES: Initial cost is high, High maintenance cost.

APPLICATIONS: All two wheeler application, Used in Traffic Jams, When travelling from one place to another place, While Parking which occupies less space, For safety purpose it is folded and placed inside the house.

V. CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between the institution and the industries.

We are proud that we have completed the work with the limited time successfully. The FABRICATION OF A FOLDABLE MOBIKE is working with satisfactory conditions. We can able to understand the difficulties in maintaining the tolerances and also the quality. We have done to our ability and skill making maximum use of available facilities.

In conclusion remarks of our project work, let us add a few more lines about our impression project work. Thus we have developed a "FABRICATION OF A FOLDABLE MOBIKE" which helps to climb up the walls of high rise buildings at a significant low cost which may be used for several applications. By using more techniques, they can be modified and developed according to the applications.

VI. REFERENCES

- [1]. Airline Baggage Regulation for Bicycle International Bicycle Fund. Retrieved 2013.
- [2]. Kevin Otto and Kristin wood. 2012. Product design techniques in reverse engineering and new product development, Pearson education, south Asia.
- [3]. T. Tomiyama, P. Gu, Y. Jin d, D. Lutters, Ch. Kind f and F. Kimura. 2009. Design methodologies: Industrial and educational applications. CIRP Annals - Manufacturing Technology. 58: 543-565.

- [4]. P.A. Rodgers, G. Green and A. McGown. 2009. Using concept sketches to track design progress. CIRP Annals - Manufacturing Technology. 58: 543-565.5
- [5]. Yousef haik. 2009. Engineering designs process. Cengage learning India private limited, New Delhi, India.
- [6]. Indian Standard, STEEL BUTT HINGES — SPECIFICATION (Fifth Revision) Second Reprint SEPTEMBER 2007.
- [7]. Shih-Wen Hsiao and Jyh-Rong Chou. 2004. A creativity-based design process for innovative product design, International Journal of Industrial Ergonomics. 34: 421-443.
- [8]. G. Lee, C.M. Eastman and C. Zimring. 2003. Avoiding design errors: a case study of redesigning an architectural studio. Design Studies. 24(5), September.
- [9]. Guinness World Records 2000 Millennium Edition, 2000, p. 301
- [10]. Kao P. Cheng, Changhua Taiwan (Feb 17 19974)
- [11]. Bicycle products News, an English monthly news paper on Bicycle trade and industry
- [12]. Design of Permanent Joints Version 2 ME , IIT Kharagpur.
- [13]. Bear hardware - WELD-ON HARDWARE NEEDS.
- [14]. Arunachalam M., Arun Prakash R. and Rajesh R. Foldable bicycle: evaluation of existing design and novel design proposals;