

# Design and Fabrication of Human Powered Cycle

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**Abstract** - The main aim of this project is to style and fabricate a cycle. generally, bicycle could be a two-wheel vehicle, which is being powered by a rider and may be steered employing a handle. it's one amongst the eco-friendlier and a cost-effective mode of transport word wide. there have been various styles of bicycle within the past history through which the prevailing form has evolved. Studies are still occurring for creating bicycling more leisurely and economical. Though bicycle could be a low-cost system that's used for travelling up to a specific distance, it needs more man power and human effort for propelling it. Hence there's always a look for a highly efficient kind of bicycle which needs less human effort for propelling it. Here introduces a replacement innovative concept. during this project the facility transmission is completed with the assistance of the Treadle mechanism by means of conventional mechanism (i.e. bicycle mechanism). The treadle mechanism is best alternative mechanism for the chains and sprocket which transmits more power from the pedal to the wheels. The design of the parts of this project is completed using the fusion 360 software and therefore the fabrication part has been meted out

**Key Words:** Bicycle, Cost-effective, Treadle mechanism, Fusion 360 software...

## 1. INTRODUCTION

The human powered cycle can be a tricycle that uses the step function of a stair climber with the motion and driving capability system instead of traditional bicycles. It consists of two links and three joints here we use the treadle mechanism where the connecting rods are used as a link during which one end is attached to the chain sprocket and another is attached to the stepper by using these links the oscillating motion of a stepper is converting into the move. This new concept replaces the quality bicycle. Because the stepper has oscillated, the power is transmitted from the stepper to the wheels through a treadle mechanism. This method is advantageous because of its low cost and high efficiency Also, the rider needn't apply maximum power on the stepper.

### 1.1 Components

The major parts that are effectively employed in the design and the fabrication of the human powered cycle are described below:

- 1.Frame.
- 2.Wheels.

- 3.Main Sprocket
- 4.Pedals
- 5.Plungers

## 2. DESIGN CONCEPT

### 2.1 CAD / CAE

Manufacturing today includes both computer-aided design (CAD) and engineering (CAE) as essential elements. The "traditional" method of creating engineering drawings—using drafting instruments—is no longer relevant. The traditional method was laborious and drawn out. Typically, the procedure took a long time and required several iterations before the draughtsman truly grasped what the designer desired. The planning process was transformed by CAD, and CAE advanced that.

### 2.2 Modeling

In addition, a model is a representation of an item, system, or concept in a form other than that of the actual entity. The process of creating a model is known as modeling; a model can also be a representation of an event or the operation of an interest system. A model honours the system it portrays while being more straightforward. A model's ability to anticipate the outcome of system modifications is one of its goals. On the one hand, a model should include the majority of the significant system's prominent features and be an accurate representation of it. On the other hand, it shouldn't be so complicated that it's difficult to understand and play around with. In addition, an honest model makes a wise choice between realism and simplicity. Simulation experts advise iteratively escalating a model's complexity. Model validity is a crucial topic in modelling. Techniques for model validation include simulating the model with known input parameters and contrasting model and system output. A mathematical model created with the use of simulation software is typically also one meant for simulation research

Software for modeling:

- Solid works
- Fusion 360
- Creo
- CATIA

etc.

### 2.3 Fusion 360

Fusion 360 could even be a cloud-Based CAD/CAM tool for collaborative development. Fusion 360 enables exploration and iteration on product ideas with an idea to production platform. Fusion 360 combines organic shapes modelling, mechanical design and manufacturing in one comprehensive package.

### 3. ENGINEERING DESIGN

To facilitate the creation of a complete digital depiction of the product being developed, Fusion includes a variety of capabilities, including the flexibility to urge the geometry of other integrated design disciplines like industrial and standard pipe work and comprehensive wiring specifications. To encourage collaborative development, there are tools available. Very early industrial design concepts are provided through concept design tools, which are later used in the engineering of the product. These include thorough free-form surface tools, reverse engineering using point cloud data, and creative industrial design sketches. Fusion 360 software is used to produce a 3D model for this project. Below are images of the models.

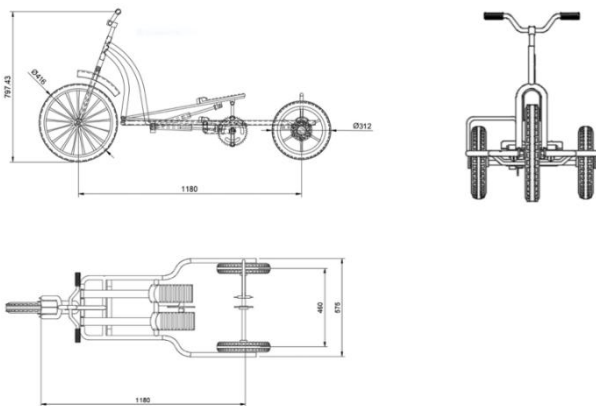


Fig-1: 2D projected views of HPC Cad assembly

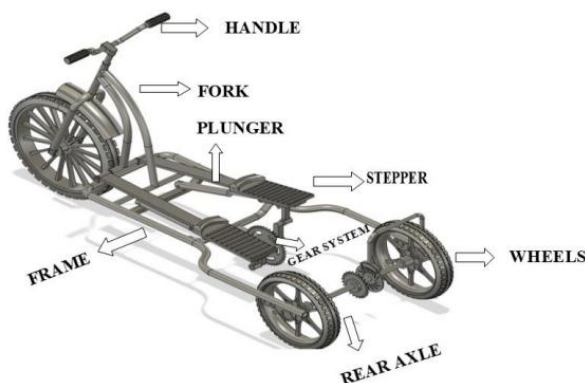


Fig-2: Description of HP cycle parts

### 4. MANUFACTURING PROCESS

Manufacturing procedures are the steps that convert raw materials into a finished item. The development of the raw materials from which the planning is derived marks the beginning of the manufacturing process. The desired part is subsequently created from these materials using manufacturing techniques. The fabric may be treated (by means of heat treatment or coating), machined, or reshaped throughout the manufacturing process. The manufacturing process also involves testing and inspections for quality assurance during or after manufacture, including planning the assembly procedure before manufacturing.

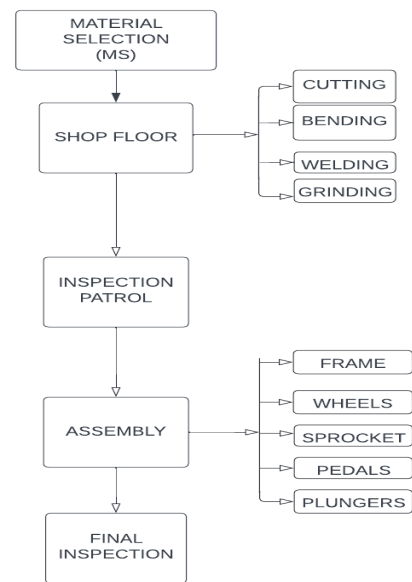


Fig-3: Manufacturing process of HPC



Fig-4: Front Wheel and Fork





#### 4.1 Merits

- The design is simple.
- Easy to fabricate.
- The fabrication's parts are made of relatively basic materials.
- There is no issue with slipping.
- The system is less expensive.
- The rider does not need to exert their whole might is to pedal

#### 4.2 Demerits

- There are more moving components.
- Incapable of long-distance travel.
- It might not be appropriate for elder generations.
- Whoever uses it has no insurance against theft or injury.
- Cycling enjoyment is influenced by the climate.

#### 4.3 List of Materials

Table -1: Input List of materials

Sl.No	Parts	Qty	Material
1.	Hollow pipe 20 mts (Frame)	1	MS
2.	Stepper	2	Plastic
3.	Plunger	2	MS
4.	Sprocket and Gear	1	Steel
5.	Cycle Accessories (Wheels, Handle, Brakes etc.)	3,1,2	Plastic and MS

#### 4.3.1 Material Cost

Table -2: List of materials cost

Sl.No	Parts	Qty	Amount Rs
1.	Hollow pipe 20 mts (Frame)	1	2750
2.	Stepper	2	1000
3.	Plunger	2	1500
4.	Sprocket and Gear	1	1250
5.	Cycle Accessories (Wheels, Handle, Brakes etc.)	3,1,2	5737

**TOTAL = 12,237/-**

#### 4.3.2 Operational Cost

Lathe, Drilling, Welding, Grinding, Power Hacksaw, Painting Cost = **6237/-**

Labor Cost = **1500/-**

Total Cost: - Material cost + Fabrication + Labor Cost = 12,237 + 6237 + 1500.

Total Cost for this project = **19,974/-**

### 5. CONCLUSIONS

This project work has provided a superb opportunity and skill, by use limited knowledge. We learned a lot of useful information. the individuals involved in this project's planning, buying, assembling, and machining. It appears that the project is also a sincere attempt to open doors between institutions and businesses. The project's end gives us the opportunity to provide a few more sentences regarding this impression project effort. In order to promote sustainable transportation and a fit and healthy lifestyle among working individuals who lead hectic lives and have little time for exercise, the "HUMAN POWERED CYCLE" was designed. It will also be a traveler's best buddy who frequently visits different locations and longs to bring a lightweight mode of transportation.

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