

# LIGHT WEIGHT FOLDING BICYCLE

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## ABSTRACT

A folding bicycle is a bicycle that is designed to fold into a compact form and facilitating transport and storage. When folded, the bikes can be more easily carried into buildings, on public transportation like; trains, buses and more easily stored in compact living quarters or board a car, boat or plane. In today's life the bicycle can play the very important role for daily transportation that makes human life easier. The reason behind increase in the importance is because of increased pollution due to automobiles and cost of fuel which is continuously increasing in present days. It is very difficult to reach the nearest public transport facility and in many cases the destination will be too far from the main roads where the public transport might not be able to contact or it might be very costly. The best thing of a folding bicycle is that it is also appropriate for air travel and can be used where inadequate parking and bicycle theft is a significant concern. The main idea of this project is to get a foldable bicycle which is light & sleek yet rigid, safe, easy to handle and easy to maintain. The proposed bicycle is designed in such a way that it is foldable by providing fasteners at the joints. The design structure imparts stable bicycle geometry. This system meets different topography and environmental conditions which are not met by the existing foldable bicycles.

**Keywords :** Bicycle; Portability; Handling; Adjustable seat.

## 1. INTRODUCTION:

We all are aware of the cost of fuels and at what speed it is increasing. In such condition it is not possible for everyone to use the services which run on fuels. In such condition, the folding bicycle plays a very important role. It not only saves the fuels but also helps to keep ourselves healthy and it does not affect the work which we will complete it by making the use of its travelling services such as the bicycle. As the weight of the folding bicycle is less than the normal bicycle it is easy to transport from one place to another. The weight of the bicycle is around 13-15 kg and the weight of the folding bicycles are around 6-8 kg with same rigidity. This is due to the light weight material used in the folding bicycle. Folding bikes generally come with a wider range of adjustments than conventional bikes for accommodating different riders. [1]. Foldable bicycle are available in market but are expensive since there are few manufacturers in any country. Hence we have opportunity to provide it at low cost by design and manufacturing foldable bicycle [2]. The choice of model apart from cost considerations is a matter of resolving the various practical requirements: a quick easy fold, compact folded size, or a faster but less compact model [3]. A product development process is the entire set of activities required to bring a new concept to a state market readiness. The design process are considered to be a set of technical activities within the product development process that work to meet the marketing and business case vision [4].

### 1.1 Objectives of Folding Cycle

1. Primary Objective of folding bicycle is its portability.
2. It can be more easily transported and stored and thus allows greater flexibility in getting from one place to another.
3. Weight of bicycle is reduced and made such that it can be made compact with minimum number of folds.
4. Easy to fold.
5. To ensure that cycling is promoted as a transport mode that can have a positive effect on a shift from the buses and trains particularly for trips.

6. Less complicated folding design.

## 2. Mechanical Design of Folding Bicycle:

### 2.1 Folding Bicycle specifications:

COLOR	Matte Cammy Green
FRAME	Custom has drawn 7005 Series Aluminium Tubing with FIT System. Front and rear Triangle.
FORK	Suspension XCT V2, 80mm travel, Alloy one piece lower, Disc Compatible
RIMS	Alloy, 32 hole, Double Wall, CNC Sidewall
TYRES	Front and Rear Specific, 26 inches x 1.95 inches
HUBSET	Formula Disc Black, Alloy Sealed front & rear with CLIX front quick release
SPOKES	14g Stainless Black
SADDLE	Mountain with Centre Gap Comfort Technology
SEATPOST	27.2 X 300mm Alloy
HANDLEBARS	Alloy 7 degree back sweep, 31.8 Barbour
STEM	Alloy Direct Connect, 105mm with 7 degree rise
BRAKESET	Front & rear mechanical disc w/ pad adjustment Alloy Levers
PEDALS	Platform pedal with alloy cage
BOTTOM BRACKET	Sealed Cartridge
FRAME SIZES	18 inches, 20 inches
STAND OVER HEIGHTS	30 inches, 31 inches
FOLDED SIZE	36 inches x 28 inches x 12 inches
WEIGHT	60 kg

### 3. COMPONENTS:

#### 3.1 FRAME:

A bicycle frame is the component of a bicycle, where the wheels and other components are fitted. The modern frame design for an upright bicycle is based on the safety bicycle, and it has two triangles: a paired rear triangle and a main triangle. This is known as the diamond frame. It should be light, strong and stiff, which can be done by mixing different materials and shapes.

#### 3.2 HINGE:

A hinge in the frame allows the rear triangle and wheel to be folded down and flipped forward, under the main frame tube, as in the Bike Friday, Brompton Mezzo Folder, and Swift Folder. Flip hinge can be combined with a folding front fork, as in the Birdy.

#### 3.3 PLUNGER:

The first widely used braking system is known as the plunger. It first appeared on the high-wheelers of the 1800. The principle of the plunger brake is by pressing down or pulling up on lever, a metal shoe is pressed against the outside of a tyre, which creates friction and slowing the bicycle down. The problems with this system include excess wear on the tyre with and bad performance on wet surfaces. Water decreases the friction between the brake shoe and the tyre, lessening the braking power.

#### 3.4 KNOB:

The present invention relates to the bicycle part field, relating in particular to may be the parts of folding crank on folding bicycle or electric motor bicycle with folding. The aim of this invention is to provide a kind of folded bicycle crank control knob.

#### 3.5 RIM AND TYRE:

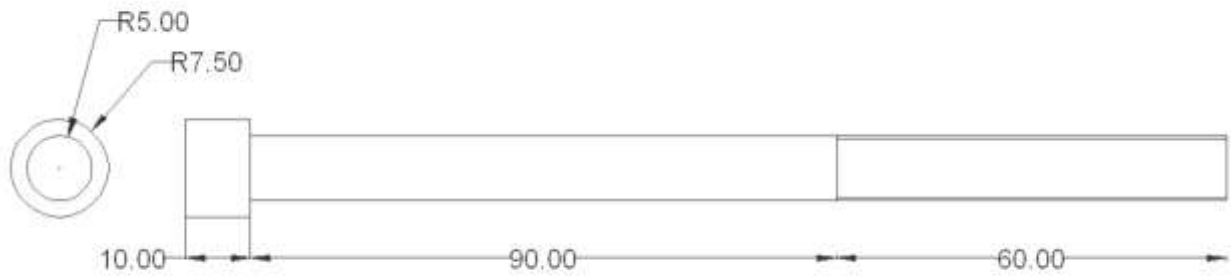
A bicycle tyre fits on the wheel of a bicycle or similar vehicle. They also used on wheelchairs and hand cycles. Bicycle tyres provide an important source of suspension, it generates the lateral forces necessary for balancing and turning & generate the longitudinal forces necessary for propulsion and braking. Although the use of a pneumatic tyre greatly reduces rolling resistance compared to the use of a rigid wheel or solid tyre, the tyres are still the second largest source, after air drag, of power consumption on a level road.

### 4. TECHNICAL SPECIFICATIONS:

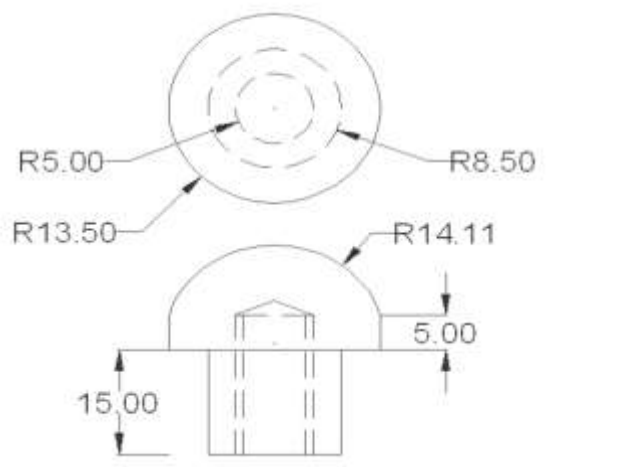
#### 4.1 HING:



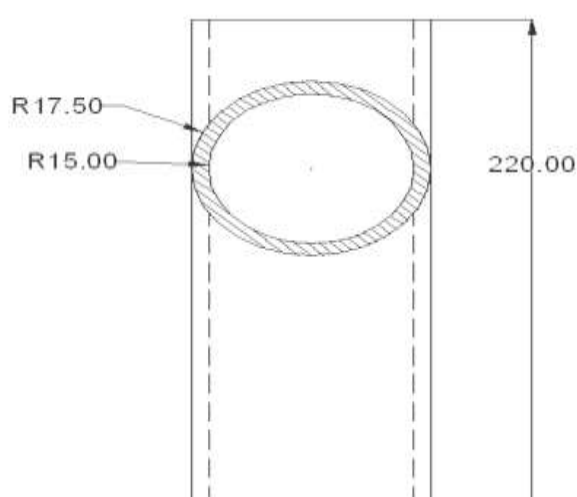
**4.2 PLUNGER:**



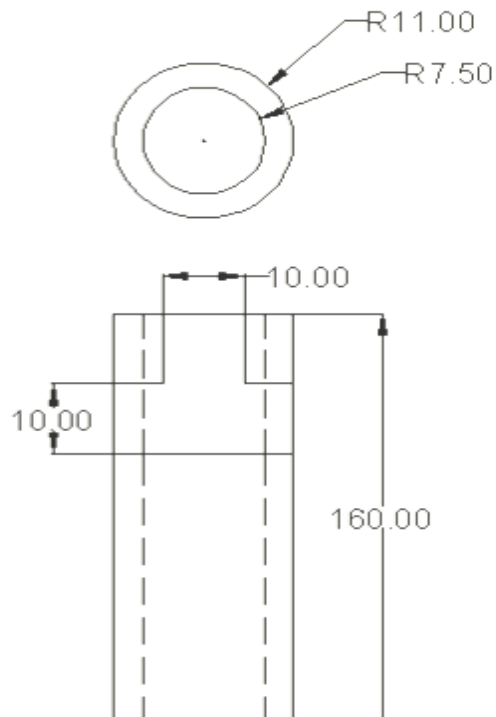
**4.3 Knob:**



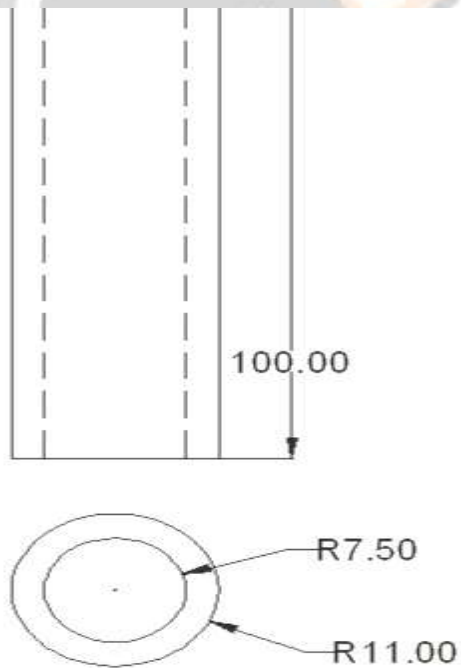
**4.4 Extended Pipe:**

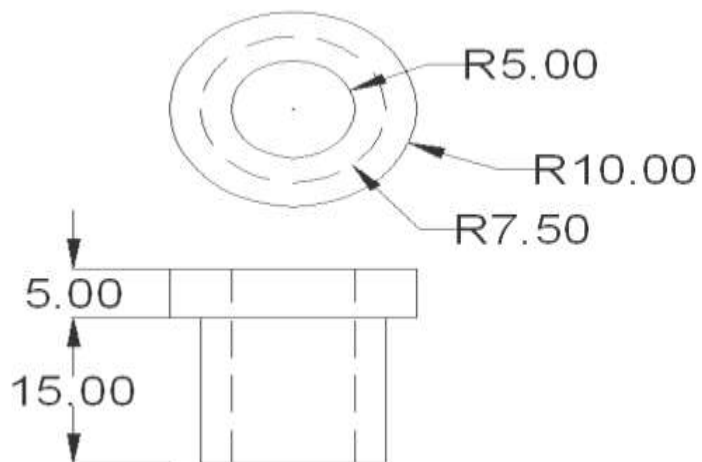


**4.5 Locking Slotted Pipe:**



**4.6 Guided Pipe:**



**4.7 Bush:****5. FABRICATION OF FOLDING BICYCLE:**

After development of CAD model, dimensions of Folding bicycle hardware components and overall dimensions of folding bicycle are fixed. Folding bicycle hardware components frame are fabricated from MS Steel, STD and Alloy Steel material.

**5.1 FOLDING BICYCLE FRAME:**

Figure: Frame



## 5.2 HINGE JOINT IN FRAME:



Figure: Hinge Joint in Frame

## 6. MAIN MODEL;



Figure: MAIN MODEL

## 7. APPLICATIONS:

- The half-and-half... Many people who work in white collar jobs need to arrive with that white collar looking fresh and crisp or they're in for some double takes and snickers. That's why so many people will go half-and-half on their commute by taking public transit, a subway or bus, into work and then riding their folding bike home. That way they get to work looking fresh and get a nice ride in on the way home. It's a great way to blow off steam and stay in shape when you don't have time for the gym.

- The combo-deal... In a life of long commutes it can seem like you spend more time sitting down than exercising. How can you wake up stuck in traffic or packed like a sardine in a subway car? Combo-deal folding bikers mix up their commute with a bike ride somewhere along the way. Whether they are driving to a parking garage and then riding the rest of the way in or riding from home to the subway or train station, these folding bike commuters are masters at the combination strategy.
- The in-and-out... This is a variation on the combo deal where another form of transportation is sandwiched between two folding bike rides. The in and out is perfect for commuters that have long train rides between destinations. They simply ride as far as they want down the line, hop on the train, and when they are close enough to keep riding they deboard and get back on their folding bike. Hour long train rides daily can be more than monotonous, they can be depressing. So in-and-outers change things up and use the train to move their bicycle commute over long distances.
- Folding bicycle design was developed to allow airborne soldiers to drop out of airplanes and helicopters, and into combat.
- Highly affordable and ideal for commuting or taking on holiday, this has plenty of great features, effective to use and an easy-to-use folding mechanism, as well as a decent luggage rack.

## 8. CONCLUSIONS

A light weight and cost effective folding a bike is designed to increase its portability, so, that the folding bicycle may be more easily transported and stored and allows greater flexibility in transport the bicycle. Many public transportation systems ban or restrict unfolded bicycles, but allows the folded bicycle in all or some of the time. For example, transport for Delhi allows folding bikes at all times on the underground, but for buses it is down to the driver's permission. Some transport operators only allow the folding bicycles if they are enclosed in a bags or any small sizes of cover. Airline baggage regulations gives permission folding bikes as ordinary luggage without any extra cost.

## 9. REFERENCES

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