

Design Modelling and Analysis of Light Weight Foldable Cycle

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Abstract—Bicycle is seen as a transportation course of action upgrading distinctive normal, monetary and social points of view. A combination of bicycle plan and setups for utility are used to pass on individual resources, fundamental supplies, adolescents and essentially more. One explicit utility bicycle is the collapsing bicycle. Its arrangement empowers customers to easily transport the bicycle using less space when the bicycle is "crumbled" in to an insignificant size. While using a collapsing bicycle with a bicycle travel, it empowers individuals ability to board travel vehicles. The flexibility of a falling bicycle is furthermore appropriate for air travel and for when lacking halting and bicycle theft is an important concern. In this paper, I am will do plan and examination of a foldable bike with reference to the hummingbird cycle which is the lightest bicycle on the planet .In this undertaking principle expect to make structure of cycle which is not exactly the hummingbird utilizing distinctive materials for the suspension and innovation to make it less weight.

Index Terms— Humming Bird Cycle , Solid Works ,Ansys ,Different Materials.

I. INTRODUCTION

In the present day way of life man can't devote explicit time for his wellbeing, significance is slightest given to exercise and body wellness because of time deficiency and unpleasant life. Corpulence is one of the basic issues found in the general public, which prompts numerous wellbeing perils. Activities are prompted for wellbeing advancement, and treatment for some infections. Transport has been one of the real issues in creating urban areas since driving starting with one place then onto the next has turned out to be dull and costly. With the petroleum and diesel costs expanding step by step, every one of the methods of transport are getting to be costly. It is hard to achieve the closest open transport office and by and large the goal will be a long way from the primary streets where general society transport probably won't have the capacity to reach because of the little streets, to keep away from which the vast majority utilize vehicles of their own, which thus prompts issues with stopping, activity, and so forth. However, not all can decide on having own vehicles as it are costly. With such issues in wellbeing, transport, space for stopping, and so forth one arrangement that strikes a chord is bike. Bikes are being advanced in the corporate and instructive areas. Be that as it may, how helpful is it to utilize a traditional bike? Much of the time there is no extraordinary office accommodated bolting the bikes and regardless of whether one is available, it is plausible to burglary, which is one of the feelings of dread that discourage utilization of bike. Regular bikes possess adequate space and thus giving one at work put or at home are very troublesome. They are likely to be presented to the climate outside and do require visit upkeep. With every single such issue in the customary bikes, the following conceivable

arrangement is the use of foldable bike. With foldable bikes, there is no issue since the bike can be collapsed and conveyed to the work put or even it very well may be utilized to achieve the closest open transport office and after that collapsed and conveyed along. Since the bike is being collapsed, it involves less space and doesn't require any exceptional parking spot. They are not presented to the climate since they can be conveyed inside structures effortlessly and henceforth inclined to less upkeep. The utilization of foldable bike helps consolidate the diverse methods of transport as referenced above, which helps in chopping down some cost engaged with voyaging. Foldable bikes are accessible in the market, yet are costly since they are being transported in. There are not very many perceived foldable bike makes in India. Subsequently we stopped the chance to give an ease, privately made foldable bike. A collapsing bike is a bike intended to crease into a reduced frame, encouraging transport and capacity. Whenever collapsed, the bicycles can be all the more effectively conveyed into structures, on open transportation and all the more effortlessly put away in conservative living quarters or on board a vehicle, watercraft or plane. Collapsing components shift, with each offering a particular blend of collapsing speed, collapsing ease, smallness, ride, weight, toughness, and cost. Recognized by the complexities of their collapsing instrument, all the more requesting auxiliary necessities, more noteworthy number of parts, and more specific market advance, collapsing bicycles might be more costly than practically identical non-collapsing models. The decision of model, aside from cost contemplations, involves settling the different down to earth necessities: a brisk simple crease, a conservative collapsed estimate, or a quicker yet less minimal model. There are additionally bikes that give comparable points of interest by isolating into pieces as opposed to collapsing.

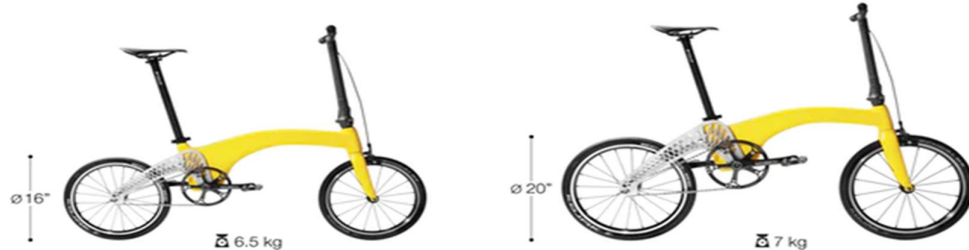


Fig: 1 Foldable Bicycle

II. METHODS OF FOLDING

A. Half- or mid-fold

Many collapsing outlines pursue the exemplary casing example of the security bike's jewel outline, however include a pivot point (with single or twofold pivots) enabling the bike to crease roughly fifty-fifty. Fast discharge braces empower raising or bringing down guiding and seat segments. A comparable swing pivot might be joined with a collapsing guiding segment. Crease plans may utilize bigger wheels, even indistinguishable size from in non-organizers, for clients organizing ride over overlay conservativeness. Bicycles that utilization this sort of overlay incorporate Dahon, and Montague, and Tern.

B. Vertical Fold

Rather than collapsing evenly, this style of bicycle has a couple of pivots along the fundamental cylinder as well as chain and seat remains that enable the bicycle to overlap vertically. The outcome leaves the two wheels one next to the other however is frequently more reduced than an on a level plane pivoted structure. The Brompton and Dahon Speed Uno both element vertical collapsing.

C. Triangle fold

A pivot in the edge may enable the back triangle and wheel to be collapsed down and flipped forward, under the primary edge tube, as in the Bike Friday, Brompton Mezzo Folder, and Swift Folder. Such a flip pivot might be joined with a collapsing front fork, as in the Birdy. Swing and flip pivots might be joined on a similar casing, as in the Brompton Mezzo Folder and Dahon, which utilize a collapsing directing segment. Collapsing instruments commonly include locks and brisk discharges, which influence the speed of the crease/unfurl. Bicycle Friday offers a model, the Tikit, including a link actuated collapsing system requiring no brisk discharges or hooks, for expanded collapsing speed.

D. Magnet collapsing and suspension framework

A magnet joined with a back safeguard frames the collapsing instrument. The magnet interfaces and locks the back wheel area to the casing. To crease the bicycle into equal parts, the magnet separates with one development and in a second, and without utilizing one's hands, the back wheel pivots forward, and the bicycle overlays vertically. This component additionally empowers one to roll the half-collapsed bicycle on its back wheel.

Advantages of a Folding Bike

- Easy to take on public transport due to small size
- Less worry about it being stolen since you can take it in anywhere
- Perfect for small apartments or condos since it doesn't take up much space
- Some will fit in carry-on luggage for a flight

Advantages of Buying a Road Bike

- Usually cheaper than a folding bike
- You can go faster on this type of bicycle
- You can get a better fitting frame for your body
- Overall, the ride is more comfortable

III. AIRLESS' NEXO SYSTEM

A standout amongst the most irritating things a cyclist can be looked with is a punctured tire. Be that as it may, soon, bikers will never again need to bear a siphon, cut fix pack and inward cylinder. Two new sorts of tire have been created that guarantee to never go level. Utah-based Nexo, has made two sorts of tires - named Nexo and Ever Tires - that are not influenced by openings or slices, it claims. The two tires, at a bargain on Kick-starter. Costs for the tires begin at \$76 (£61) for an Ever Tires wheel set at 20 to 24 inches, and can reach up to \$360 (£289) for any arrangement of four feels burnt out on any size. Level free tires are not totally new, but rather they are not generally utilized due to poor firmness and stun retention contrasted with ordinary ones. Yet, Nexo's new tires would like to handle these issues, while additionally decreasing the quantity of tires and cylinders that are discarded every year. Ever Tires are planned with immense gaps around their sides, made of a polymer mix called 'Nexell' that the organization has developed. Nexell professes to offer pad, flexibility and toughness. Each tire can keep going for 5,000 miles (8,048km), yet cyclists wishing to purchase these should purchase a radical new wheel. The Nexo tire does not have noticeable openings, which implies it very well may be appended to existing wheels, however just last 3,100 miles (4,988km).



Fig: 2 Air less Nexo tyres

IV. MODELLING OF A BICYCLE USING SOLID WORKS SOFTWARE

SOLIDWORKS is a solid modeling computer-aided design (CAD) and computer-aided engineering (CAE) computer program that runs on Microsoft Windows. SolidWorks is published by Dassault Systèmes.

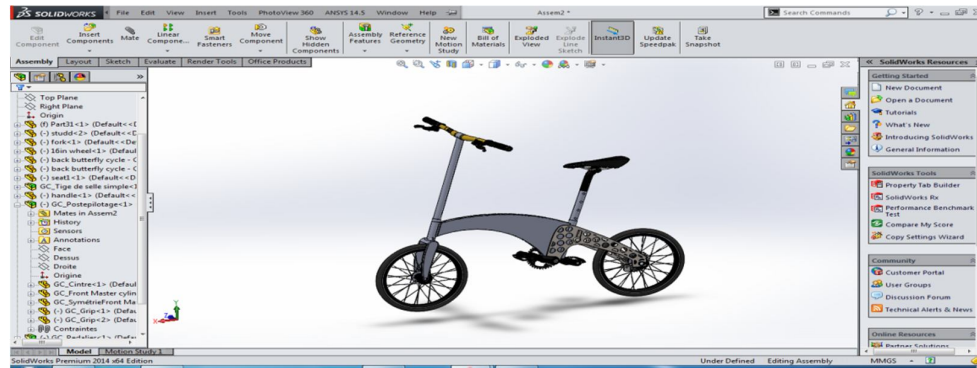


Fig: 3 Assembly of cycle



Fig: 4 Rendered image of the cycle



Fig: 5 Folded view of the cycle



Fig: 6 Rendered image of the cycle with back ground

V. ANALYSIS USING ANSYS WORKBENCH SOFTWARE

In this paper static analysis is done with the different materials applied on the rear and front frame of the cycle to check the deformation, stress and strain on it by applying the 980N of load on it.

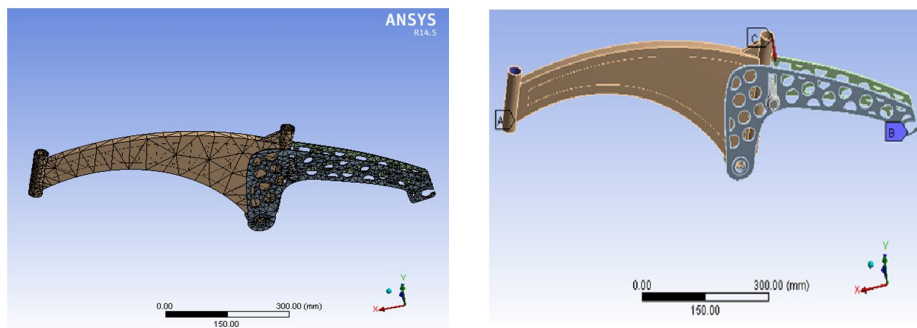


Fig: 7 Meshing and Boundary conditions applied to the frame

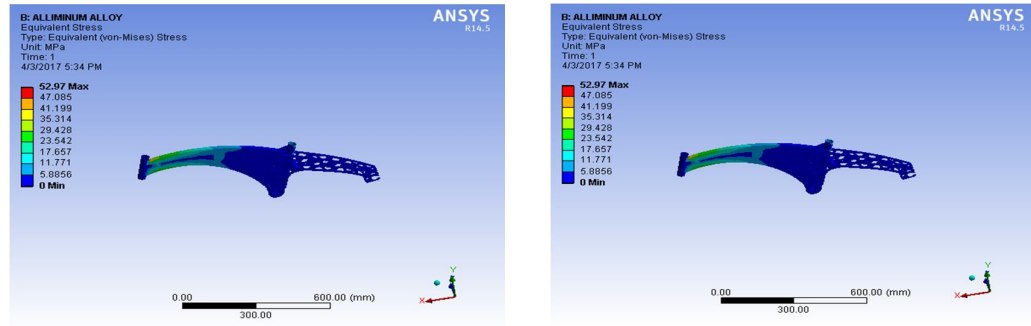


Fig: 8 Equivalent elastic strain and Vonmises Stress

VI. RESULTS &CONCLUSIONS

Material	Total deformation	Stress	Strain
Steel	1.47569 mm	53.795 M.Pa	0.00029295 mm/mm
Aluminium	1.3395 mm	52.97 M.Pa	0.00081327 mm/mm
Titanium	0.99006 mm	52.119 M.Pa	0.00059245 mm/mm

From the above table it is observed that out of different materials used in the frame, Titanium has good properties, but cost point of view aluminium is the best because deformation and stress doesn't have much difference between Aluminium and Titanium.

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