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Design and Simulation of Electric Treadmill Bike

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Abstract: Electric treadmill The bicycle is a whole new way of moving. With the help of electricity, walking is no more strenuous than a "walk in the park". The power assistance combined with the equipment increases your walking pace to speed. When you walk on the treadmill bike, push the treadmill back with your feet. The movement of the treadmill gives the signal to the electronic device that drives the motor. The movement of walking. The brake motor slows down the speed. This Paper clearly explains the design and simulation of the electric treadmill bike
Keywords: Electric Treadmill Bike, Treadmill Bike, Design, Analysis, Ansys, Electric Bike.

I. INTRODUCTION

The electric treadmill bike is the combination of two things: i.Treadmill and Electric Bike. The treadmill is a piece of equipment used for exercising in order to stay fit and healthy. The treadmill machines are designed to eliminate the forces of impact and adapt to the dynamics of human movement. This developed mechanism is designed to to mitigate the effects on the joints while firmly simulating the gait cycle.

The electric bicycle is one that uses electrical energy as the main source of energy. The treadmill bike gives you the pleasure of cruising, biking and running on a treadmill portable vehicle, allows you to go jogging without getting your shoes dirty, the electric treadmill eliminates the problem of nightly battery charging, instead it uses unused energy Tired of turning the roller for charging / while driving on sloping roads, the person can turn on the electrical system and navigate like an electric bike. Under construction it consists of a manual treadmill, alternator, brushless DC motor, batteries and DCDC converter. While the walker walks / runs on the treadmill, the bike moves like a bike.

In order for this to develop, one needs transmission through gear trains. When a private vehicle (cars, bikes) is inaccessible, use this technology as an urban mobility vehicle to avoid all kinds of pollution. Women, on the other hand, burn 106 and 74 respectively. It grant you to stay physically active while traveling.

You can exercise morally at any time of the day. If you drive a car regularly, you can exercise just as often. Basically, you kill two birds with one stone when you run on the treadmill. It has a rugged design and off-road tires that allow you to ride rough roads or speed through evergreen forests.

If you want to explore less traveled roads, you can. do this on the electrically assisted treadmill. Allows jogging or walking without dirtying or modifying your shoes Thanks to the sturdy belt that provides support, you don't have to worry about slipping or falling off the treadmill.

You are fit and balanced enough to run on an electrically assisted treadmill drive. But even if you are not that effective, you can get started on the treadmill bike. It has a brake that instantly shuts off the engine and a freewheel that you can activate when driving downhill. It has safety features that you won't find on a regular bike.

II. AIM OF THE PROJECT

1) In our day to day life we see that so many people's use bikes cars as a source of transportation. This appear in environmental pollution and fuel consumption.
2) In manual treadmill the motion of the treadmill is rugged to overcome this we use a motor to rotate the rotors.
3) Batteries which are mostly used in automobile sector is not rechargeable thus when they disposed create pollution.

To improve all above phenomenon we take initiative by designing something new which would help to reduce these harmful phenomenons

A. Design of Electric Treadmill Bike

The design was performed in CATIA. By using tools like pad, pocket, revolve, rib, slot etc…
Firstly we need to select the part design for starting the design in Catia software.

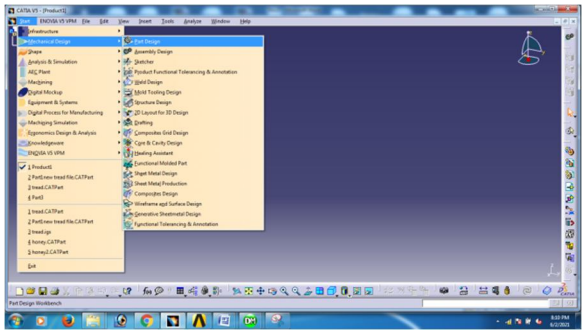


Fig: Initial stage of Design of Treadmill.

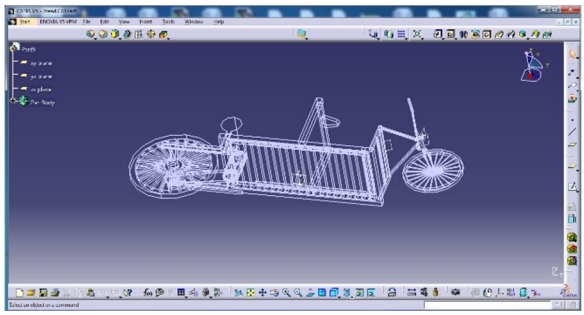
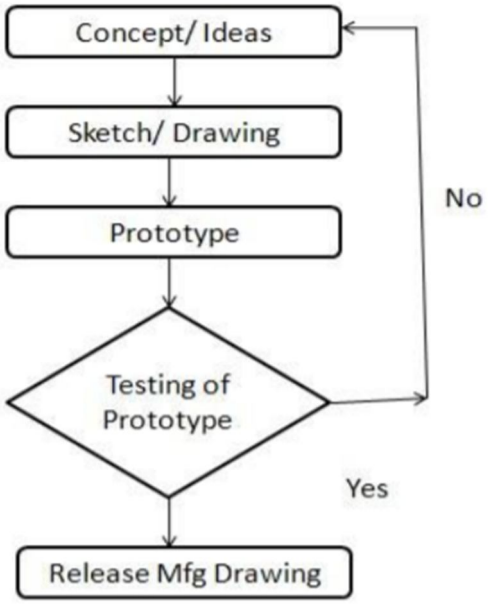


Fig: Design of Electric Treadmill bike

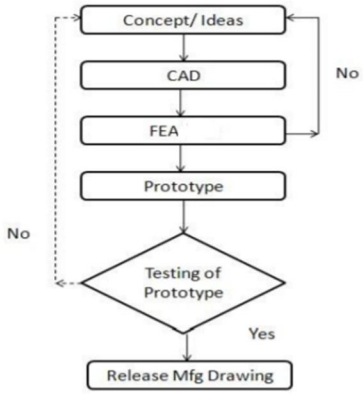
III.SIMULATION

A. Conventional approach of Manufacturing a Product

In the conventional approach, the ideas are first made into drawings. With the Help of drawings the prototype will be prepared. By the visual inspection of the prototype the product is prepared. After the manufacturing the product upon appropriate inspection the Product will be released to market. This is the time consuming broad process.



In the computer aided Engineering all the steps involves computer i.e., in conventional approach the first step involves the conversion of idea into a sketch on paper, in the case of CAE approach the first involves conversion of idea in to CAD model, in the next step performing the analysis using Finite Element Analysis, CFD if required later this step the CAD designed model will be sent to preparation of prototype. After completion of visual inspection of the prototype. The Design is sent for manufacturing upon inspection of the product, it will launch in the market.



Simulation of the treadmill bike was performed using Ansys Workbench Software. Analysis was performed using 3 different materials such as Cast Iron, Aluminium, Structural Steel.

B. Static structural Analysis

Static Structural Analysis is the analysis over the body up on load and applying boundary conditions remain stationery and will not change over time.

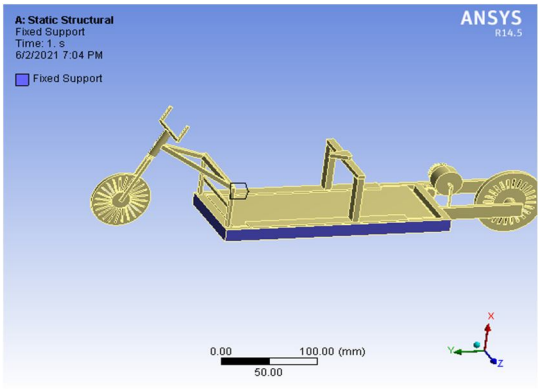


FIG: The frame is fixed

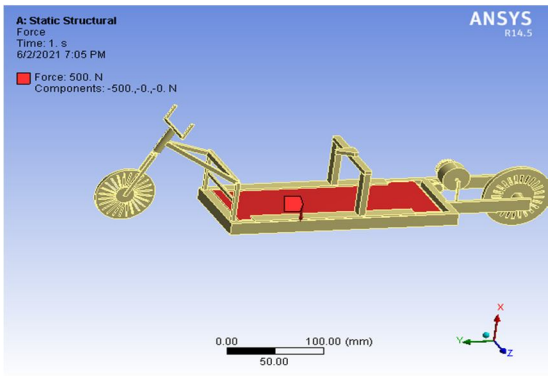


FIG :The force is applied on the frame

C. Static Structural Analysis

1) Aluminum Alloy

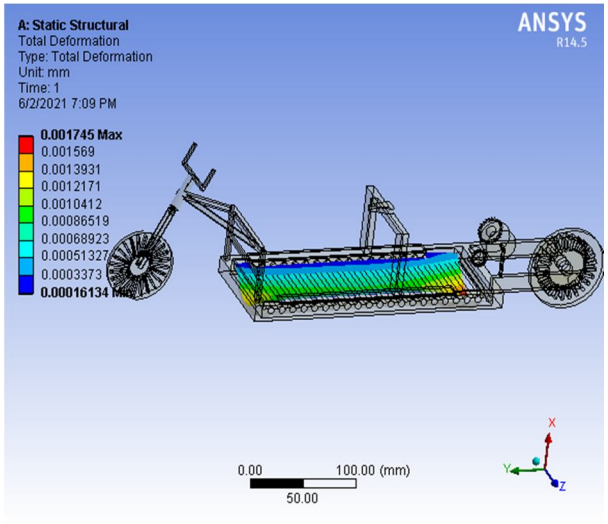


FIG: Total Deformation

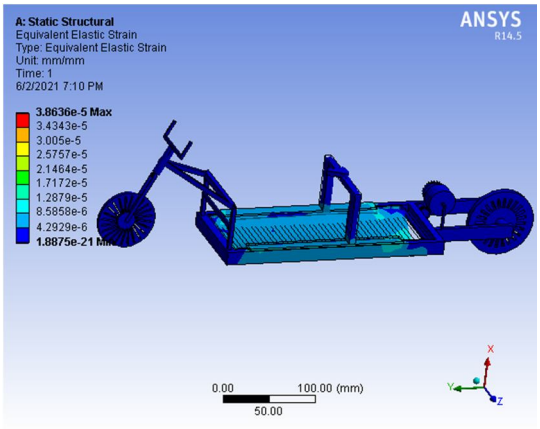
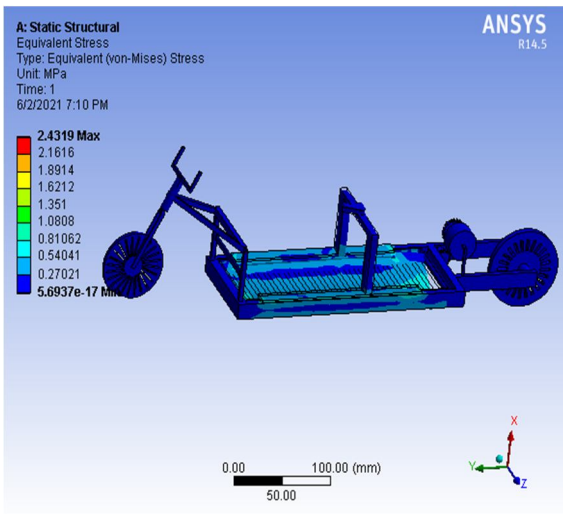


FIG: Equivalent Elastic Strain



FIG; Equivalent Stress

2) Structural Steel

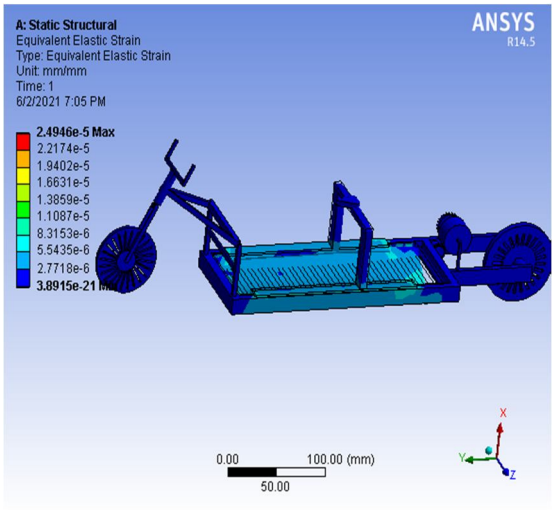


FIG. Equivalent Elastic Strain

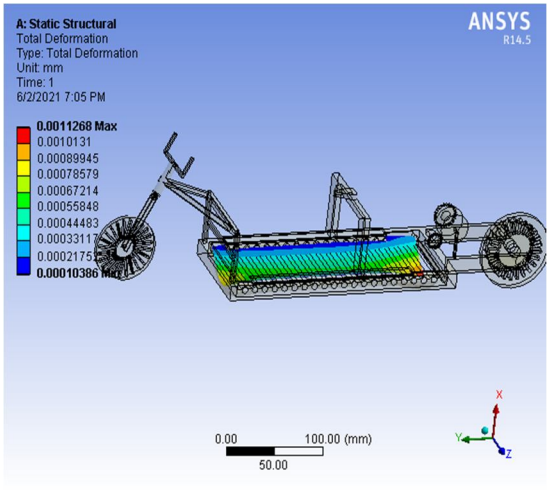


FIG: Total Deformation

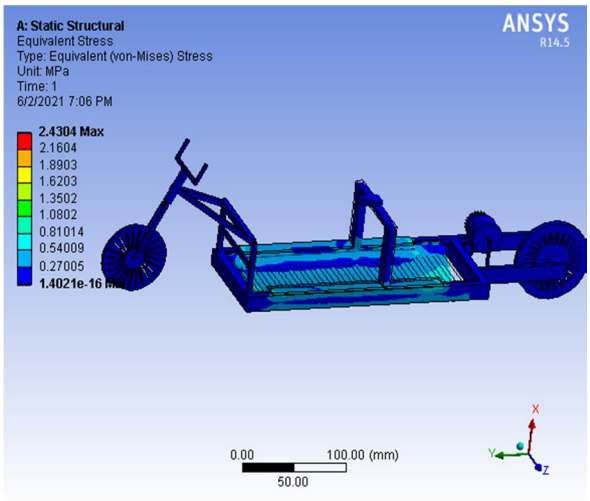


Fig Equivalent Stress

IV. OBSERVATIONS

The design and Simulation of Treadmill bike was done using using Catia and Ansys package. The Analysis was done for 4 types of materials and the detailed observations was tabulated .

Material	Total Deformation		Equivalent Elastic Strain		Equivalent Stress	
	Min. mm	Max. mm	Min.	Max.	Min. Mpa.	Max. MPa
Structural steel	5.7656e-005	6.1828e-004	2.1256e-021	1.3708e-005	1.5535e-016	2.4375
Aluminum Alloy	1.6134e-005	1.745e-003	1.8874e-021	3.8636e-005	5.6925e-017	2.4319
Stainless steel	5.9628e-005	6.412e-004	1.57e-021	1.4207e-005	9.5622e-017	2.4354
Copper alloy	1.0386e-004	1.1268e-003	3.8918e-021	2.4946e-005	1.4024e-016	2.4304

Table: Comparison of Analysis results of various parameters with various materials

V. CONCLUSION

The Treadmill bike was Design and Simulation was done using Computer aided Software packages such as Catia and Ansys.By observing all the simulated result. The best material for fabrication is Aluminum as the deformation is very less up on considering the load as 200 N.

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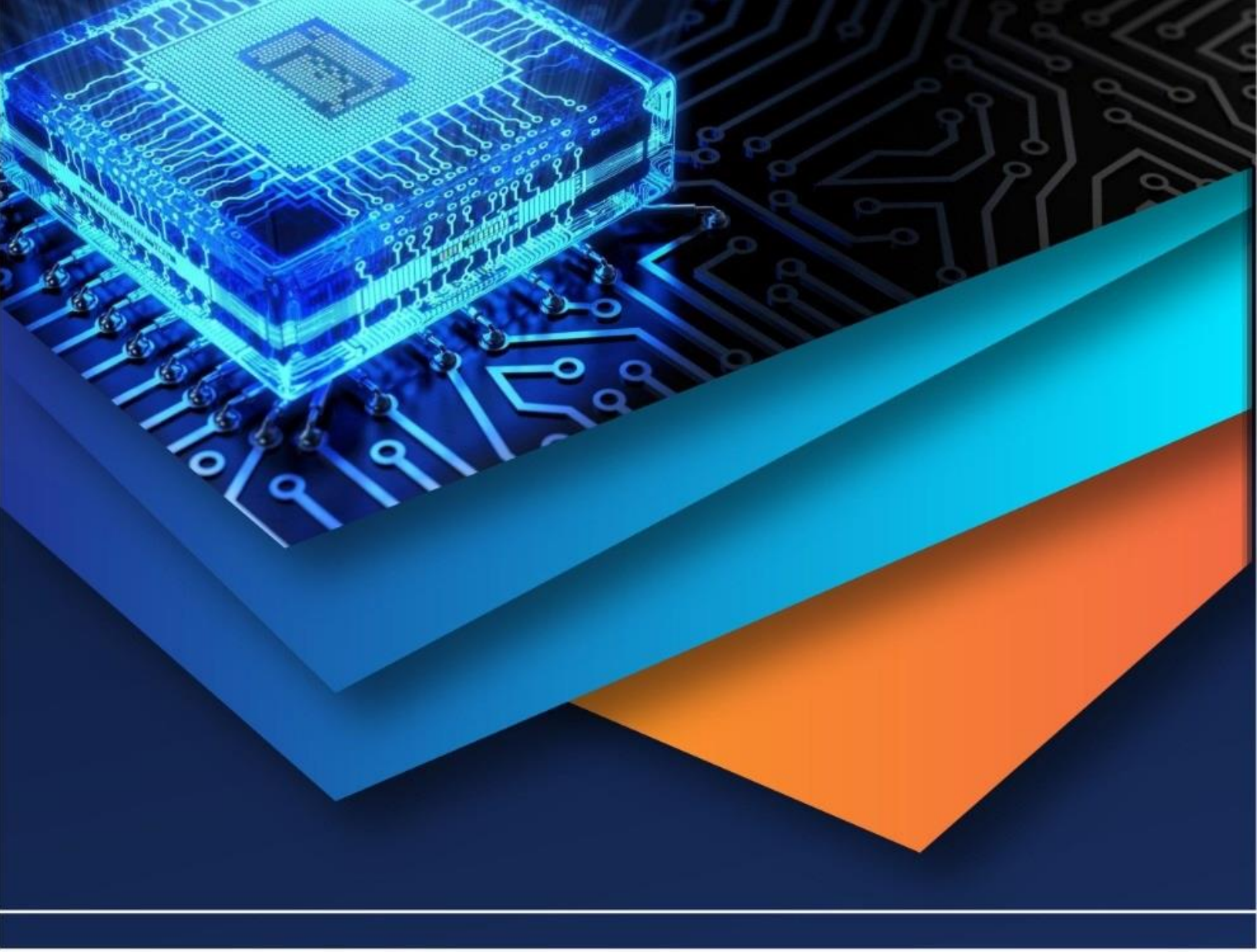

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