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Hubbless Bicycle Design With Handle Bar Folding Mechanism

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ABSTRACT

Generally in any conventional bicycle there exists a conventional chain drive system where power is transmitted from pedal to rear wheel .The conventional system have numerous disadvantages. Like the heavy maintenance frequent lubrication. Now all this advantages are overcome with the help of hubbless drive in which the rear wheel is having internal gear while the driving wheel have external tooth.The rear wheel is kept larger than that of front wheel for greater speed and for comfortable drive. The design of machine height, energy expenditure in hand operation and lighting condition of machine are the certain design consideration in project

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I. INTRODUCTION

Generally in any conventional bicycle there exists a conventional chain drive system where power is transmitted from pedal to rear wheel. In conventional chain drive system there are certain disadvantages as bellow Chain drives need accurate mounting and careful maintenance.Chain drive has velocity fluctuation when unduly stretched.Limitation on speed ratio because maximum allowable speed for chain drives is below 1100 rpm.Lower transmission efficiency due to polygon effect in chain.High production cost for shimano shifter mechanism.Fragile and unreliable shifter mechanism leads to continuous chain drop after certain wear.

II. PROBLEM SOLUTION

Thus there is need of a drive that replaces conventional chain drive with more efficient drive like a spur gear.

a) Different size wheels , rear wheel is larger than front wheel , gives more speed and comfortable ride
b) Rear wheel drive is through a spur gear ring and spur pinion pair driven using a toothed belt drive. Makes system light weight and maintenance free and noiseless.
c) Drive components are fitted inside the rear hubbless wheel …this makes design unique. Extremely compact, offers more space.
d) Arrangement of pedal system is more comfortable to drive, drive is more robust as the center distance from drive pedal input to the hubless wheel drive spur pinion is short to lesser transmission losses.
e) Spur gear drive efficiency is above 90% which is a known fact. Which is 20% more than the conventional chain drive.
f) Higher speeds can be achieved using this design as there is no limitation on input speed of spur pinion. Which is advantageous over chain drive which has limitation of 1100 rpm.

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III. DESIGN METHODOLOGY

In our attempt to design a special purpose machine we have adopted a very a very careful approach, the total design work has been divided into two parts mainly;

System design
Mechanical design

System design mainly concerns with the various physical constraints and ergonomics , space requirements, arrangement of various components on the main frame of machine no of controls position of these controls ease of maintenance scope of further improvement ; weight of m/c from ground etc. In Mechanical design the component in two categories.

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Design parts
Parts to be purchased.
For design parts detail design is done and dimensions thus obtained are compared to next highest dimension which are readily available in market this simplifies the assembly as well as post production servicing work.The various tolerance on work are specified in the manufacturing drawings the process charts are prepared & passed on to the manufacturing stage .The parts are to be purchased directly are specified &selected from standard catalogues.
System Design

In system design we mainly concentrate on the following parameter
System selection based on physical constraints:-
While selecting any m/c it must be checked whether it is going to be used in large scale or small scale industry In our care it is to be used in small scale industry So space is a major constrain .The system is to be very compact it can be adjusted to corner of a room.

The mechanical design has direct norms with the system design hence the foremost job is to control the physical parameters so that the distinction obtained after mechanical design can be well fitted into that.

Arrangement of various component
Keeping into view the space restriction the components should be laid such that their easy removal or servicing is possible moreover every component should be easily seen & none should be hidden every possible space is utilized in component arrangement.

Components of system:-

As already stated system should be compact enough so that it can be accommodated at a corner of a room. All the moving parts should be well closed & compact A compact system gives a better look & structure.

Man –m/c Interaction:-

The friendliness of m/c with the operation is an important criterion of design. It is application of anatomical
Following are some e.g. of this section

Design of machine height
Energy expenditure in hand operation
Lighting condition of m/c

Chances of failure
The losses incurred by owner in case of failure of a component are important criteria of design. Factor of safety while doing the mechanical design is kept high so A conclusion section is recommended as it helps the readers to check the relevance. Conclusion may the scope of the work presented in the paper.

that there are less chances of failure there over periodic maintenance is required to keep the m/c trouble free.

Servicing facility:-
The layout of components should be such that easy servicing is possible especially those components which required frequent servicing can be easily disassembled.

Scope of future improvement:-
Arrangement should be provided to expand the scope of work in future such as to convert the m/c motor operated this system can be easy configured to required one.

Height of m/c from ground:-
Fore ease and comfort of operator the height of m/c should be properly decided so that he may not get tired during operation .The m/c should be slightly higher than that the level also enough clearance be provided from ground for cleaning purpose.
Weight of machine:
The total weight of m/c depends upon the selection of material components as well as dimension of components. A higher weighted m/c is difficult for transportation & in case of major break down it becomes difficult to repair.

Mechanical Design
Mechanical design phase is very important from the view of designer .as whole success of the project depends on the correct deign analysis of the problem. Many preliminary alternatives are eliminated during this phase. Designer should have adequate knowledge above physical properties of material, loads stresses, deformation, and failure. Theories and wear analysis, He should identify the external and internal forces acting on the machine parts
These forces may be classified as;
Dead weight forces
Friction forces
Inertia forces
Centrifugal forces
Forces generated during power transmission
Designer should estimate these forces very accurately by using design equations .If he does not have sufficient information to estimate them he should make certain practical assumptions based on similar conditions which will almost satisfy the functional needs. Assumptions must always be on the safer side.

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Selection of factors of safety to find working or design stress is another important step in design of working dimensions of machine elements. The correction in the theoretical stress values are to be made according in the kind of loads, shape of parts & service requirements.
Selection of material should be made according to the condition of loading shapes of products environment conditions & desirable properties of material. Provision should be made to minimize nearly adopting proper lubrications methods. In, mechanical design the components are listed down & stored on the basis of their procurement in two categories

Design parts
Parts to be purchased

For design parts a detailed design is done & designation thus obtain are compared to the next highest dimension which is ready available in market. This simplification the assembly as well as post production service work. The various tolerance on the work are specified. The process charts are prepared & passed on to the work are specified. The parts to be purchased directly are selected from various catalogues & specification so that anybody can purchased the same from the retail shop with the given specifications.

IV. CONCLUSION

Hence we have discussed the performance of hub less bicycle design in the paper. We are getting following conclusion from the testing performed on the model

1. Light weight system
2. Maintenance free operation
3. 93% efficiency of spur gear drive
4. Frequent maintenance issue is solved .

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