

FUEL CONSUPTION USING FREE WHEEL METHOD IN TWO WHEELERS

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ABSTRACT

Nowadays people concentrate more and more on the comfort and operability of automobiles. Four wheel-drives in cars have become popular and are in demand in the automotive sector. But the advancement in two wheelers was limited. The concept of two wheel drive motorcycles was not successfully and economically implemented. Two wheel drive motorcycle is desirable in situations where there is rough terrain and high inclination roads which are tiresome and difficult to drive with the conventional rear wheel driven motorcycles. The two wheel drive bikes are apt for farmers, military applications, desert drive etc. The proposed design provide economical and user friendly two wheel drive. The use of chain drive and sprockets help in reduction of power loss during transmission of power from the engine to front and rear wheels. The lightweight 'all-mechanical system' is used to obtain two wheel-drive. Under optimum traction conditions, the rear wheel is actually driving faster than the front wheel and the one-way clutch within the system allow the front wheel to freewheel under these conditions. At this point, the two wheel drive system is effectively passive. Though the front drive system is turning, it is not actually transferring power to the front wheel. When the rear wheel loses traction, the drive ratio, relative to your forward speed, changes. The two wheel drive system engages transferring power to the front wheel until traction is re-established at the rear wheel.

1. INTRODUCTION

Two wheel drive system is a solution to these limitations. In this system power is given to both the front and the rear wheel. That is, if the rear wheel slips the power given to the front wheel is enough to move the motorcycle forward. This system is similar to the four wheel drive system used in cars. With the two wheel drive system the load carrying capacity, traction and cornering ability of two wheelers are increased. It also results in unmatched hill climbing ability when compared with conventional motorcycles available in the market today. Because of this they are preferred for farm lands and military applications (reconnaissance missions). It is evident from the fact that a decade ago the two wheel drive motorcycles were limited to dirt races and mountain races. But now they are being wanted for farm and military applications and more companies are showing interest in the two wheel drive system on motorcycles.

1.1 AVAILABLE DESIGNS

YZ250 capacity engines. Also the cost of the above two designs are very high. CHRISTINI BIKES, one of the leading companies in manufacturing two wheel drive The current available designs have several disadvantages. The cheapest one among them costs above \$8000 and common people cannot afford it. Also the transmission systems employed in such designs are more complex. The current designs available are using hydraulic transmissions, which thus have high power loss. The very big size of these bikes makes them suitable only for limited uses like race events etc. One of the available designs is ROKON 2WD bike, which have got a full time two wheel drive system employed. The full time two wheel drive mechanism has considerably less fuel economy. And also the size of these bikes is very high which limits the use. Another design available is YAMAHA250

2. COMPONENT DESCRIPTION

2.1 VEHICLE SELECTED

The selected vehicle is a YAMAHA CRUX motorcycle. It has a 106cc four stroke engine, made by India Yamaha motor. crux designed for Indian market first launched in 20004 replacing RX100 air cooled four stroke SOHC two valve cylinder used in vehicles engine.



Fig.1 vehicle used

2.2 BEARINGS AND BUSHES

A bush is a mechanical fixing between two, possibly moving, parts, or a strengthened fixing point where one mechanical assembly is attached to another. In a car or other vehicle's suspension, bushes are used to connect the various moving arms and pivot points to the chassis and other parts of the suspension. A bearing is a device to permit fixed direction motion between two parts, typically rotation or linear movement.



Fig.2 Ball bearing

2.3 FREE WHEEL

A free wheel is used in order to make the two wheel engagement automatic. The free wheel used is the commonly available one for bicycles.

Specifications:

Pitch = 12.7 mm

Number of teeth = 18

Weight = 175 g.



2.4. SPROCKET

Sprockets and chains are used to transmit power from engine output to the front wheel. In the design three sprockets were used.

a. Sprocket 1:

The sprocket 1 is coupled to the engine output shaft and delivers power to the freewheel.

Specifications:

Pitch = 12.7 mm

Number of teeth = 16.

Material : Steel C45

b. Sprocket 2:

Sprocket 2 obtains power from CV joint and transmits it to the front wheel.

Specifications:

Pitch = 13.4 mm

Number of teeth = 13

Material : Steel C45



3. DESIGN AND PROCEDURE

- A chain drive is taken from the pulley to a position below the handle.
- The end of this chain drive is coupled to one side of a tripod CV joint.
- A sprocket is fitted at the right end of the CV joint.
- A chain drive is taken from this sprocket to the sprocket at the front wheel.
- The length of the pulley axis is increased.
- A free wheel (number of teeth: 18) is attached to the left shaft of the CV joint. A free wheel is a one way clutch which transmits power in only one direction, and in opposite direction there will be no power transmission. It is commonly used as the sprocket at the rear wheel of bicycles.

- At the other end of the CV joint another sprocket (number of teeth: 13), with greater pitch, is fixed. The front wheel of the motorcycle is replaced by the rear wheel of the similar motorcycle having the rear sprocket (number of teeth: 52).

4. WORKING

In consumption using free wheel method, the free wheel reduce usage fuel by applying break suddenly it avoid slipping of wheel by free wheel. It's working is based on the working principle of the two-wheelers. In motor bike power is transmitted from engine's pinion to the rear wheel i.e.(rotary motion of the pinion makes the linear motion of the chain. That linear motion of the chain is absorbed by rear wheel's sprocket and converted into rotary motion).That rotary motion of the rear wheel makes the bike romove Based on this side stand retrieve system is designed.If Sprocket is kept between the chain drive, it make the sprocket to rotate. The working of this system is based on the sprocket. It gains the power from the chain and make specially designed component (lifting lever) to rotate. This rotation incites engaged pushing lever to push the side stand to retrieve. When chain rotates in anti-clockwise direction the inciter assembly's sprocket absorbs the power and rotates in clockwise direction

5.PROBLEMS ENCOUNTERED

- During the progress of the project many problems were encountered. Some of them are:
- The vehicle was not turning the required angle due to offset of the CV joint turning axis and vehicle axis.
- Heavy Vibration.
- Chain drive failure due to chain slackening at rough terrain travel.
- Failure of chain drive at higher speeds.
- Increased turning radius of the motorcycle because of restriction provided by the CV joint rubber bushing.

6. SOLUTIONS

- Reduce the offset in the CV joint axis and steering axis, CV joint was shortened in length (excess length removed) and found successful.
- To reduce vibration additional bearing was introduced at the input shaft of CV joint and found successful.
- To obtain rigidity extra support was welded to the support assembly.
- Misalignment of the chain was rectified.
- Bushing was removed and low resistance bushing was incorporated.

7.APPLICATION

- Used in all type of two wheelers, geared, non geared, Hand gears.
- Used for higher efficiency.

8.CONCLUSION

The rear wheel drive motorcycle which we initially started with was successfully converted into a two wheel drive motorcycle with automatic engagement within the given span of time. Automatic engagement of the front wheel was made possible by using a free wheel. At optimum running condition the vehicle behaves same as a rear wheel drive vehicle and do not produce any problems. The turning radius of the vehicle is found to be 2.5 meter, with an increase of only 0.5 meter from the initial condition. Since we made simple design the weight of the vehicle increased by only 6kg and hence there is no much variation in the fuel efficiency of the motorcycle.As we used chain drive, the power loss is very less when compared to the older designs by Yamaha, Rokon etc. The motorcycle effectively negotiates steep inclination which it couldn't make up in the normal rear wheel drive and moreover, it navigates with minimum effort in muddy and slippery condition. The load carrying capacity of the motorcycle has also increased slightly.We obtained a higher sprocket ratio at the front wheel than that of the back wheel and hence the front wheel rotates at a lower rpm than the rear wheel. During normal run by the action of the free wheel, no power is utilized by the front wheel and only during the slip of rear wheel the front wheel drive engage its action. So we could effectively create an automatic engagement of the front wheel drive.There can be a lot of improvisation in our design and can launch the two wheel drive bikes in the market. The turning radius of the two wheel drive motorcycle is found to be 2.5m, but in the original vehicle is 2m. The increase in the turning radius

is because of the limitation of the CV joint and a slight offset between the steering axis and the CV joint turning axis. By using a smaller CV joint designed for two wheel drive motor cycles the turning radius can be reduced. Also the design proposed under the title Future scope can be implemented.

The increase in vibration as the speed of the motorcycle increases is due to low rigidity of support assembly, using a more rigid and robust support frame for the CV joint-freewheel assembly the vibrations can be reduced and vehicle can attain higher speeds.

9. REFERENCES

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