

Cost analysis of MotoGine Hybrid Scooter

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Abstract -This paper aims at the new concept of “MotoGine Hybrid scooter” which has two power systems i.e. petrol engine and electric system. In this project work we have converted Tvs-scooty-pep⁺ scooter into hybrid vehicle. Rear wheel will be driven using conventional engine and front wheel will be driven using electric motor mounted in the same wheel. During running of vehicle using engine as power source the batteries will get charged and that stored power will further be used for running the vehicle on electric system. In case of failure of engine vehicle can be operated using motor power or in case of failure of motor vehicle can be operated using engine power.

During operating of scooter either engine power or motor power can be used to propel the same.

Keywords- Hybrid scooter, Petrol engine-electric system, Alternator

I. INTRODUCTION

Hybrid vehicles are becoming more popular and more common. Basically, a hybrid vehicles is one that uses more than one power source i.e. an electric motor and a conventional engine. Though use of hybrid vehicles are now increasing because of emission free and maximum mileage.

II. TYPES OF HYBRID VEHICLES

The Hybrid vehicle has two types which is described as follows,

- **Series hybrid vehicle-** In this type electric motor provides the driving torque and the gasoline engine only charges the battery pack.
- **Parallel hybrid vehicle-** In this type to propel the vehicle it uses both an internal combustion engine and electric motor.

III. COMPONENTS OF HYBRID VEHICLES

Hybrid vehicle has the following parts,

- **Gasoline engine** – It produces the power to run the vehicle.
- **Fuel tank** – It is the tank used to store the fuel.
- **Electric motor** – It acts as a secondary prime mover.
- **Generator** – It generates the electricity by consuming mechanical power.
- **Batteries** – It is used to store the electric energy.
- **Transmission** – It is used to transmit power from prime mover to road wheels by using various transmission elements.[2]

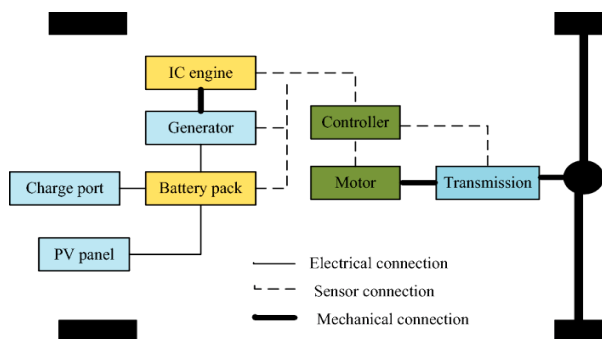


Fig. 1. Components of Hybrid vehicle.[3]

IV. LITERATURE REVIEW

Today we face one major problem by our country is the increased demand & high prices of fuel. Today the need of our world is environment friendly vehicles as the pollution is getting increased. Air pollution is of serious.

All India level study indicates that two wheelers segments accounts for the highest consumption at 61.42%. So, Hybrid vehicles can reduce CO2 emissions.

Today advance technologies are emerging with the different types of vehicles also numerous types of hybrid vehicles are available in market but the initial & maintenance cost of this vehicle is very high.[4]

HYBRID ELECTRIC VEHICLE is a combination of a conventional internal combustion engine and an electric propulsion system.[1]

V. METHODOLOGY

Following methodology is adopted for converting the moped from conventional to hybrid.

1. We have selected Tvs- scooty-pep+ moped, for converting it into hybrid and we checked it's physibility.
2. At front we fitted electric drive wheel and necessary wiring have been prepared
3. After completing all fittings necessary inspection is carried out and various tests have been conducted.
4. After completing tests, we find out average of moped in both drives. i.e- Electric and Engine.
5. The comparison of cost is done between engine and electric drive.

VI. CONSTRUCTION

The already existing technology of electric system for two wheeler is one in which the only source of energy is rechargeable batteries, which can be charged with the help of a charger. After complete charging of batteries, the power is given to the electronic controller by using an MCB and a switch. Further this power goes to electric motor which starts rotating and finally the two-wheeler will run as shown in fig.1. In this project motor will freely rotate with the wheel while the scooter is operating on IC engine and will act as a generator, the generated power will further go to the controller, then is cutout through a switch and ampere meter and then finally the energy is stored into the batteries.

The motor is connected to the batteries with the help of wiring system along with a controller, an MCB, a switch and a throttle. As the batteries are fully charged, the operator can switch to battery system by switching off the IC engine and then switching ON the MCB so that scooter is now fully operated on

the electric system. Now the scooter will run on electric system with the help of accelerator. This running of vehicle on electric system will be costfree and pollution free.

For example, while the scooter will cover a distance of 35km on petrol during that time batteries are charged with the help of alternator. Now you can switch to electric system and then further will complete a specific distance and this cost of running a specific km on electric system is free and pollution free.

- Cost for petrol (1ltr) :- Rs.78.5/-
- Monthly consumption of petrol :- 15 lit.
- Total cost of petrol for the month:- 15*78.5=Rs. 1177.5/-
- Average of moped/lit :- 22 Km
- Speed Range :- 30 to 40 Km/Hr.

On Electric motor:-For calculating average we operate our moped in between 30 to40 Km/hr till battery gets fully discharged and we get the following reading.

- Time for full charging of batteries:- (4-5 hrs)
- Electricity consumption:- 3 units
- Cost for 3 units:- 3.5*3= Rs.10.5/-
- Average for 1 time charging:- 8 km.
- Total cost of charging for 25 days:- 25*10.5=Rs. 262.5/-
- **Saving of cost = Petrol Cost – Electric cost**

$$=1177.5-262.5$$

$$=Rs. 915/-$$

Table 1-Cost of operating moped using various drives.

Sr no.	Various Costs	Cost in Rs.
1	Petrol cost	1177.5/-
2	Electric charging cost	262.5/-
3	Saving of cost	915/-

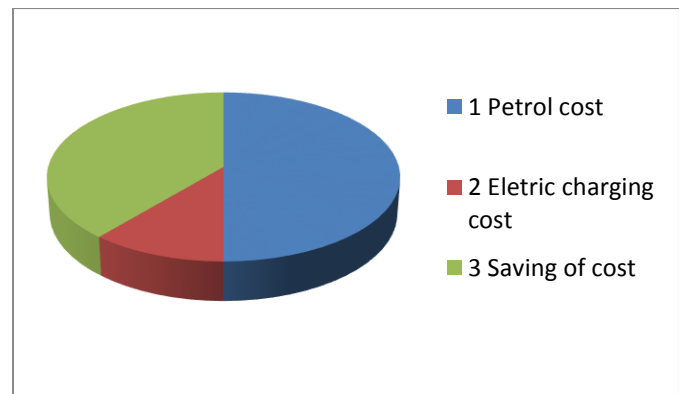


Fig. 2: Pie chart for various costs.



Fig. 2. MotoGine Hybrid scooter.

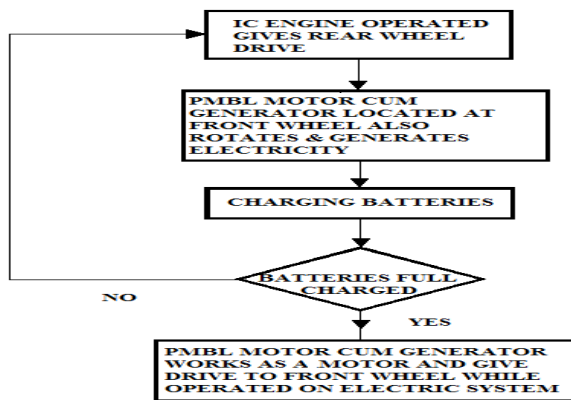


Fig. 3. Flow chart of proposed system.[4]

VII. TEST RESULTS

On Engine:- For calculating average we operate our moped in between 30 to 40 Km/hr till fuel tank gets empty and we get the following reading.

VIII. DISCUSSION

From the test results we can see that if we operate the moped using electric drive then there is considerable saving in cost. The cost of operating moped using electric drive it is 22.25% of total

petrol cost for the same average. We can also say that the fuel cost gets decreased by Rs.-915/- i.e.- 77.70%.

IX. CONCLUSION

After carrying out this particular type of work, we exactly understood the following things,

1. By considering both drives i.e. electric and engine, whenever we operate mopeds using electric drive, fuel cost decreases drastically and that also environment friendly because of no pollution.
2. Because of both drive it is possible to operate moped either in electric or on engine drive in case of failure of any one system.
3. By using electric drive maintenance cost can be less.
4. This Hybrid vehicle will be very useful in remote areas as in such areas the fuel is not easily available.

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