

MECHATRIC

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Abstract— The main problem with electric scooters that we see now has a very low range. These specifications create a problem in a city where we do not have much of electric charge stations compared to that of fuel station. The solution- A Hybrid Scooter, which eliminates the problems of Electric scooter. This is the main reason why we think that a hybrid scooter, which runs on electricity as well as on a petrol engine, could be a solution to this problem. Two power generators in one for optimal use at all times. Hybrid adopts a drive in which the action of the two power generators (electric and petrol) combine to provide uninterrupted power in a synergy that benefits the user and is environment friendly. It simply means that scooter runs on electric motor and IC engine.

Key words: power generators, A Hybrid Scooter, HSD system

I. INTRODUCTION

Air pollution is one of the serious environmental concern in present time. The requirement of controlling this air pollution is an important aspect. Now, various mediums are responsible for the air pollution. But to emphasize one medium and controlling it is the Automobile sector.

Most of the Cities are also experiencing rapid urbanization and the majority of the country's population is expected to be living in cities. The rapid urbanization has also resulted in a tremendous increase the number of vehicles. The vehicle numbers have even doubled in some cities in the last one decade. According to the survey done by the Department of Road Transport and Highways (2008) & Society of Indian Automobile Manufacturers (2008), two-wheelers showed 7% increase in registration from 2004 to 2007. This increased numbers have indirectly given rise to air pollution. So it's important to adapt the alternative methods to avoid usage of petrol and diesel fuels.

Now, when emphasizing on two wheelers, there are various alternatives that can be already seen in market. The E-bikes or (Electric Bikes) are readily available in the market. These bikes run totally on electricity. The main problem of the electric scooters that we see now has a very low range factors that creates a problem. These specifications create a problem in a city where we do not have much of electric charge stations as that of petrol pumps.

The solution to this problem is our attempted project that is the Hybrid Scooter, which eliminates all the problems of Electric bike as well as the pollution hazard of a conventional petrol bike/scooter.

A. Concept Working

As discussed earlier, this project eliminates the drawbacks of both petrol bikes and electric bikes. The main problem of an electric bike is the speed and range as per the availability of electric recharge stations. One the other hand petrol bikes create air pollution which needs to be controlled.

So the concept of our project is to eliminate the drawbacks of both the types of bikes and combine it to create a hybrid bike. The hybrid bike works on both petrol as well as electricity.

For understanding this, let us focus on the working of this bike. The concept of this bike is that it first works on an electric charge and as the charge is over, it is switched to petrol mode where it runs the bike as well as charges the battery. Once the battery is fully charged, the bike can again run on electric charge. Giving the rider option of total electric or Petrol-electric combination.

B. ENGINE^[3]

A Two-stroke engine is a type of internal combustion which completes a power cycle in only one crankshaft revolution and with two strokes (up and down movements) of the piston in comparison to a four stroke, which uses four strokes. This is accomplished by the end of the combustion stroke and the beginning of the compression stroke happening simultaneously and performing the intake and exhaust functions at the same time. An internal combustion engine (ICE) delivers power most efficiently over a small speed range, but the wheels need to be driven over the vehicle's full speed range. In a conventional automobile the geared transmission delivers different discrete engine speed-torque power requirements to the wheels. Geared transmissions may be manual, with clutch, or automatic, with a torque converter, but both allow the engine and the wheels to rotate at different speeds. The driver can adjust the speed and torque delivered by the engine with the accelerator and the transmission mechanically transmits nearly all of the available power to the wheels which rotate at lower rate than the engine, by a factor equal to the gear ratio for the currently selected gear. This limited gear-ratio set forces the engine crankshaft to rotate at speeds where the ICE is less efficient, i.e., where a liter of fuel produces fewer joules. When an engine is required to operate efficiently across a broad RPM range, due to its coupling to a geared transmission, manufacturers are limited in their options for improving engine efficiency reliability, or lifespan, as well as reducing the size or weight of the engine. This is why the engine for an engine-generator is often much smaller, more efficient, more reliable, and longer life than one designed for an automobile or other variable speed application

II. LITERATURE REVIEW

Electric motorcycles and scooters are plug-in electric vehicles with two or three wheels powered by electricity. The electricity is stored on board in a rechargeable battery, which drives one or more electric motors. Electric scooters (as distinct from motorcycles)

In 1928, the United States Navy's Bureau of Engineering proposed a diesel-electric transmission. Instead of driving the propeller directly while running on the surface, the submarine's diesel drove a generator that could either charge the submarine's batteries or drive the electric

motor. This made electric motor speed independent of diesel engine speed, so the diesel could run at an optimum and non-critical speed. One or more diesel engines could be shut down for maintenance while the submarine continued to run on the remaining engine or battery power.

Toyota's HSD system replaces a normal geared transmission with an electromechanical system. An internal combustion engine (ICE) delivers power most efficiently over a small speed range, but the wheels need to be driven over the vehicle's full speed range. In a conventional automobile the geared transmission delivers different discrete engine speed-torque power requirements to the wheels. Geared transmissions may be manual, with clutch, or automatic, with a torque converter, but both allow the engine and the wheels to rotate at different speeds. The driver can adjust the speed and torque delivered by the engine with the accelerator and the transmission mechanically transmits nearly all of the available power to the wheels which rotate at lower rate than the engine, by a factor equal to the gear ratio for the currently selected gear. This limited gear-ratio set forces the engine crankshaft to rotate at speeds where the ICE is less efficient, i.e., where a liter of fuel produces fewer joules. Optimal engine speed-torque requirements for different vehicle driving and acceleration conditions can be gauged by limiting either tachometer RPM rate or engine noise in comparison with actual speed. When an engine is required to operate efficiently across a broad RPM range, due to its coupling to a geared transmission, manufacturers are limited in their options for improving engine efficiency, reliability, or lifespan, as well as reducing the size or weight of the engine. This is why the engine for an engine-generator is often much smaller, more efficient, more reliable, and longer life than one designed for an automobile or other variable speed application.

III. SELECTIONS

Alternator- [2]

Selected alternator-
Two 24volt 40 ampere
Working Rpm- 300-7000

A. Power Input:

- This circuit is used for external charging of battery.
- Input- 220-240v AC 6amp
- Output- 48v dc 2.5amp
- Engine 3.5hp 2stroke 6500max rpm
- Battery 4nos
- 12v 20Ah

IV. THE DESIGN

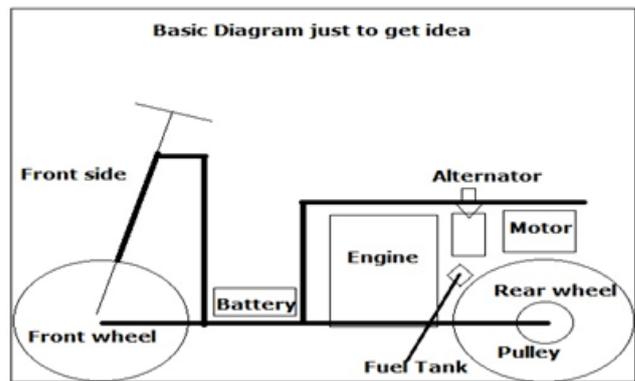


Fig. 1: Design

V. CALCULATIONS

A. Theoretical Consumption Rate:

- Battery Amp/hour rating 100
- Working voltage 36v
- Battery capacity= $100 \times 36 = 3600$ watt/hr
- Required power= 800 watt

Theoretically battery will last 4hours at 454rpm and delivering 800watt of power

B. Theoretical Generation Rate [1]

- Selected Alternator generates
1200watt at 3000rpm
1680watt at 4200rpm
- Required power while charging= Battery charging rate + Motor consumption rate.
- Battery charging rate= $0.5 \times [\text{battery capacity}/10]$
- Required = $180 + 800$ watt/s = 980>

So when engine runs it has the capacity to charge the battery and also drive the motor.

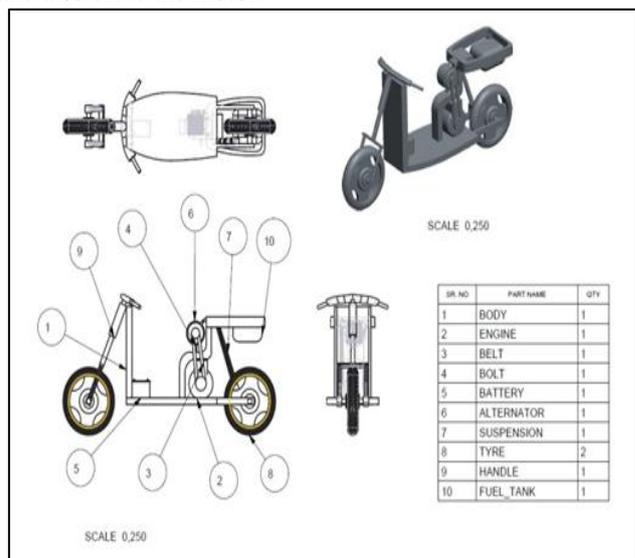


Fig. 2:

VI. FUTURE SCOPE

A. SCOPE:

- This project has been selected with a view to encourage people to use Electric bike against Petrol bikes

- Once our country has enough charging stations like we have Petrol stations this project can be upgraded to 2nd Generation Hybrid bike

B. 2nd Generation Hybrid Bike Is:

- Engine and Alternator eliminated with extra battery or Solar Panels
- Acceleration
- Regenerative braking

VII. CONCLUSION

As for the conclusion, we have some points to present about the project that makes this concept work as a future substitute for petrol scooters. This hybrid technology promises the appropriate consumption of energy when fuels like petrol are available in less quantities. This scooter is different than that of the present electric scooters as these provide more power, speed and range.

The advantages of this concept scooter overcomes all the drawbacks of electric as well as petrol scooters and makes this drive more efficient. The only disadvantage of this concept as of now is that there are no charging station available as that of petrol vehicles having petrol pumps and the weight of vehicle is considerably high when compared to weight to power ratio. But this factor can be eliminated as soon as the charging stations are available for time to time charging.

This concept surely promises future technology and also equally importance in the coming future.

VIII. ACKNOWLEDGEMENT

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