INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH & DEVELOPMENT

ISSN: 2278 – 0211 (Online)

Gasoline Electric Hybrid Car

T.Alekya
Electrical and Electronics Engineering
IV/IV B.Tech, K.L.University
Vaddeswaram, A.P, India

Mr.Kasi Rama Krishna reddy
Assistant professor, K.L.University, India

Abstract:
We are running out of fossil fuels, so we are searching for alternatives. In automobile industry the alternatives using are HYBRID CARS. Here we are going to discuss gasoline based hybrid electric car. This car uses less fuel and it causes less pollution. As the fossil fuel cost increasing and green house effects are increasing day by day, the hybrid cars are competing with convectional cars.

A hybrid electrical vehicle is a type of hybrid vehicle and electric vehicle which combines an internal combustion engine propulsion system with an electric propulsion system. The presence power train is intended to achieve either a better fuel economy than a conventional vehicle, or better efficiency. The most common form of hybrid electrical vehicle is hybrid car although hybrid trucks and buses also available.

The gasoline car meets all the requirements but produces a relatively large amount of pollution and generally gets poor gas mileage. An electric car however produces almost no pollution but it can only go 50 to 100 miles (80 to 161 km) between charges. And the problem has been that the electric car is very slow and very inconvenient to recharge.

A gasoline electric car combines these two set ups into one system that leverages both gas power and electrical power. The structure of hybrid car harnesses to increase efficiency and gives performance that is required. The key to a hybrid car can be gasoline engine is much smaller than the one in convectional car and therefore more efficient. We can improve the fuel economy And we can get better mileage. Already the hybrid cars are in market and their sales are improving drastically, so, this car will be leading in automobile industry.

Keywords: *hybrid, gasoline, battery, regenerative breaking, IC engine*

1.Introduction

In our busy lives, cars are sought out to be one of the best modes of transportation. But, with the rising economy, people tend to buy cars that have better mileage. But still we think of trading cars with something that is cheaper when we look at the rising petrol costs. Though we do not think much about the environmental effects, we must still consider the fact that cars are the major contributors to pollution. To an extent, hybrid cars can be a remedy to many of these problems. A lot of car manufacturers have started new plants to produce their own version of hybrid cars.

A hybrid electric vehicle (HEV) is a type of hybrid vehicle and electric vehicle which combines a conventional internal combustion engine (ICE) propulsion system with an electric propulsion system. The presence of the electric power train is intended to achieve either better fuel economy than a conventional vehicle, or better performance. A variety of types of HEV exist, and the degree to which they function as EVs varies as well. The most common form of HEV is the hybrid electric car, although hybrid electric trucks (pickups and tractors) and buses also exist.

For example, a **mo-ped** (a motorized pedal bike) is a type of hybrid because it combines the power of a gasoline engine with the pedal power of its rider. Any vehicle that combines two or more sources of power that can directly or indirectly provide propulsion power is a hybrid. Most hybrid cars on the road right now are gasoline-electric hybrids.

2.Why Hybrid

Traditional cars and trucks are propelled by an internal combustion engine, which relies exclusively on gasoline to generate power, but hybrid vehicles combine the internal combustion engine with an electric, battery powered motor. This twin power source gives hybrid vehicles advantages over cars that use a single power source. The following are the main basic parameters for buying a hybrid car.

Price: As told earlier hybrid cars have a much more initial expense than the ordinary ones. Hybrid cars range in prices from $20,000 to $50,000. The price varies according to the size of the car and also the style. So, decide wisely as this is a lot of money.

Presently, hybrid cars cost 15 -25% more than standard vehicles (e.g. Toyota Camry hybrid costs US$25 000 and a non hybrid version can cost around US$21 000). As much as 10% of this can be deducted under clean air regulations in some US states.

Figure 1: Commuting Distance (Southern California)

2.1.Conventional Cars V/S Hybrid Cars

Car	Cost	Difference	City L/100km	HWL /100km	AVG L/100km	L / year	Gas $/yr	yrs to payback
Civic LX	$25,170	–	8.2	5.7	6.95	1390	$1,807	–
Civic Hybrid	$29,200	$4,030	4.7	4.3	4.5	900	$1,170	6.33
Corolla LE	$24,665	–	7.4	5.6	6.5	1300	$1,690	–
Prius	$32,866	$8,201	4	4.2	4.1	820	$1,066	13.14
Ford Escape (fwd)	$30,226	–	10.3	7.7	9	1800	$2,340	–
Escape Hybrid	$35,119	$4,893	5.7	6.7	6.2	1240	$1,612	6.72
Camry LE	$30798	–	9.5	6.2	7.85	1570	2041	–
Camry Hybrid	$36191	$5,393	5.7	5.7	5.7	1140	1482	9.65

Table 1: Comparison Of Conventional V/S Hybrid

- It seems that the best "value" out of the bunch is the Honda Civic Hybrid which would take over 6 years for the gas savings to make up for the difference in cost. Even though the Prius claims the best fuel mileage, it's the worst value of the bunch. The Prius would take over 13 years to pay for its premium, that's 13 years too long for me. With all the extra electronics involved with a Hybrid, it's also bound to have extra maintenance costs also, which is not accounted for.
- Out of the vehicles compared, the price premiums attached to the hybrid vehicles are just too great to be considered a cost savings relative to purchasing their gasoline counterpart as shown in table 1.0. In order for me to even consider a Hybrid, their prices would have to come down to the level of their gasoline competition.
- Mileage among the category. There are cars with mileages varying from 65mpg to 28 mpg.
- Travel comfort: For long distance traveling, travel comfort plays a very important role. There are cars with comfortable hatchback and others with leg room, boot capacity and overall space. But to get all these features in one car is a little difficult. So begin a massive search for them.
- Mileage: Clearly, hybrids have a lot more mileage than the conventional cars. But still try to buy cars that have better

3.Innovation Potentials

The first patent worldwide for a gasoline-electric powered vehicle was applied in 1905. Its goal was not to increase fuel efficiency, but to enhance the acceleration power up to 10 seconds from 0 to 40 kph. But the development of internal combustion engines went on quickly and fuel efficiency was not an issue for customers at that time. Thus, the first hybrid model offered in 1914 in the USA was not successful on the market. Further serious developments of hybrid models were pushed forward in the early 1990 in Europe, but due to the market entry of clean diesel technologies and stagnation in battery technology this stand of car development was given up by European manufacturers. Driven by the enormous air quality problems in the big metropolitan areas of Japan and the US and the non-acceptance of diesel as a car fuel in these countries, TOYOTA developed and successfully introduced the first serial hybrid electric car, the Prius. To explore the innovation dynamics in this applied technology field we have analyzed the

patents applied for several components of hybrid cars at the European Patent Agency (EPA) and the World Patent Office (WO). We have concentrated on components of hybrid cars as the hybrid concept itself is a modular technology for which no all embracing patents can be expected. Concerning the components we have concentrated on the three key elements

• Electric motors

• Battery technology and

• Combustion engines

For transmission or gear systems and power regulation electronics no specific patents have been found and it can be suspected that the innovation dynamics in these areas is less expressed as for the key elements considered here. The patent search strategy has been defined on the basis of patent classes using the nomenclature of the international patent classification (IPC). Search worlds have not been used as applicants formulate the patent description commonly in rather general terms to broaden the possible fields of application. As further applicants in some cases 7 try to "hide" their patents by allocating them to less appropriate patent classes the search strategies have been verified by intensive sample tests.

4.Types Of Hybrid

- PARALLEL: In parallel hybrids the ICE and the electric motor are both connected to the mechanical transmission and can simultaneously transmit power to drive the wheels, usually through a conventional transmission. Parallel hybrids are also capable of regenerative braking and the internal combustion engine can also act as a generator for supplemental recharging. Parallel hybrids are more efficient than comparable non-hybrid vehicles especially during urban stop-and-go conditions and at times during highway operation where the electric motor is permitted to contribute.

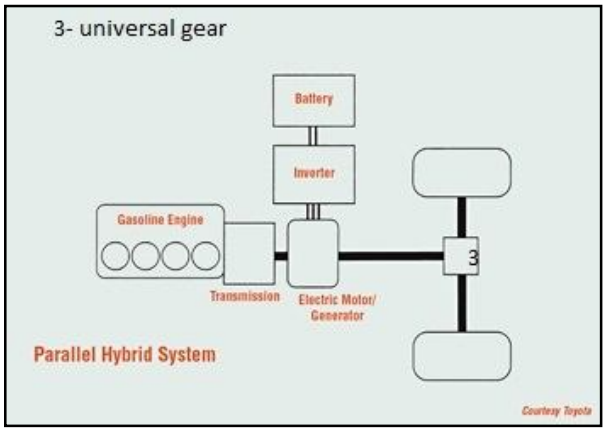

Figure 1: parallel hybrid block diagram

- SERIES: In series hybrids, only the electric motor drives the drive train, and the ICE works as a generator to power the electric motor or to recharge the batteries. The battery pack can be recharged through regenerative braking or by the ICE. Series hybrids usually have a smaller combustion engine but a larger battery pack as compared to parallel hybrids, which makes them more expensive than parallels. This configuration makes series hybrids more efficient in city driving.

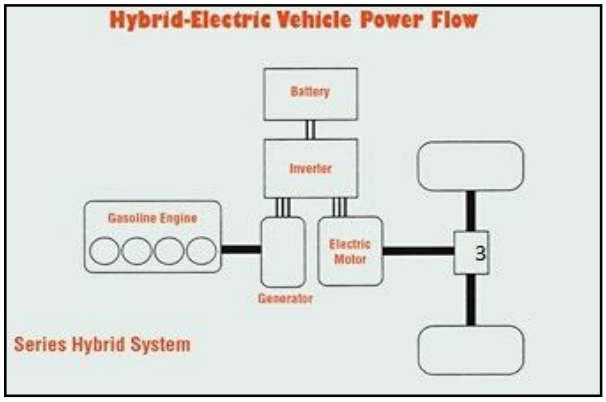

Figure 2: series hybrid block diagram

- SERIES-PARALLEL: power- split or series-parallel hybrids. They incorporate power-split devices allowing for power paths from the engine to the wheels that can be either mechanical or electrical .The main principle behind this is the decoupling of the power supplied by the engine (or other primary source) from the power demanded by the driver

A combustion engine's torque output is minimal at lower RPMs and, in a conventional vehicle, a larger engine is necessary for acceptable acceleration from standstill. The larger engine, however, has more power than needed for steady speed cruising. An electric motor, on the other hand, exhibits maximum torque at standstill and is well-suited to complement the engine's torque deficiency at low RPMs. In a power-split hybrid, a smaller, less flexible, and highly efficient engine can be used. The smaller engine, using a more efficient cycle and often operating in the favorable region of the brake specific fuel consumption map, contributes significantly to the higher overall efficiency of the vehicle

Power-split hybrids have the benefits of a combination of series and parallel characteristics. As a result, they are more efficient overall, because series hybrids tend to be more efficient at lower speeds and parallel tend to be more

Efficient at high speeds; however, the power-split hybrid is higher than a pure parallel

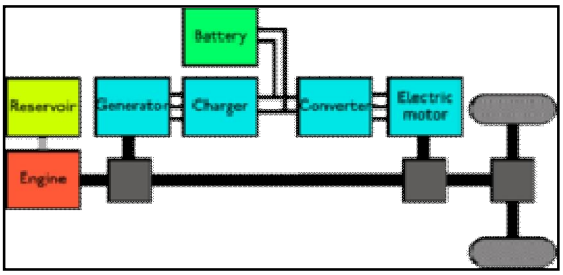

Figure 3: series-parallel hybrid block diagram

5.Types By Degree Of Hybridization

Full hybrid, sometimes also called a strong hybrid, is a vehicle that can run on just the engine, just the batteries, or a combination of both. . A large, high-capacity battery pack is needed for battery-only operation. These vehicles have a split power path allowing greater flexibility in the drive train by inter converting mechanical and electrical power, at some cost in complexity.

Mild hybrid, is a vehicle that cannot be driven solely on its electric motor, because the electric motor does not have Enough power to propel the vehicle on its own. Mild hybrids only include some of the features found in hybrid technology, and usually achieve limited fuel consumption savings, up to 15 percent in urban driving and 8 to 10 percent overall cycle. A mild hybrid is essentially a conventional vehicle with oversize starter motor; allowing the engine to be turned off whenever the car is coasting, braking,

or stopped, yet restart quickly and cleanly. The motor is often mounted between the engine and transmission, taking the place of the torque converter, and is used to supply additional propulsion energy when accelerating. Accessories can continue to run on electrical power while the gasoline engine is off, and as in other hybrid designs, the motor is used for regenerative braking to recapture energy. As compared to full hybrids, mild hybrids have smaller batteries and a smaller, weaker motor/generator, which allows manufacturers to reduce cost and weight.

6.The Hybrid Propulsion Technology

Hybrid vehicles comprise of both, an internal combustion engine plus a battery powered electric motor. Other forms of hybrid solutions are possible, such as the combination of fuel cell and electric motors or the combination of different fuels, but here we concentrate on hybrid electric vehicles (hevs) and particularly on hybrid electric passenger cars. Currently, hybrid cars lead the eco rankings of independent consumer organizations due to their commonly high fuel efficiency. Hybrid cars have the potential to be more 4 fuels efficient than common cars as the electric motor serves the drive train under conditions where combustion engines work inefficiently. This is particularly the case at low speeds or when accelerating. Further, the battery of the electric motor can make use of brake energy (recuperation). Cycle. while ordinary cars use more fuel in city traffic than on inter-urban roads, hybrids are more fuel efficient in urban traffic. Outside urban areas the combustion engine is more efficient than the electric motor and is thus used, but the heavy battery has to be moved around with the car.

7.Gasoline-Electric Hybrid Structure

There are mainly 5 essentials for a hybrid car. They are

- Conventional car engine – It can be a gasoline engine or also petrol or diesel respectively. But whatever engine is used, will be more advanced than the usual ones, as they have to work together with the electrical system. They will be smaller with greater efficiency and lesser emissions.
- Fuel Tank – For storing the fuel needed to rum the car engine.
- Batteries – Batteries are needed to store and release energy as required by the car. The energy from the battery is taken by the motor.

- Electric Motor and generator – Though motors can act as generators, both of them are needed for this car. A motor will be needed to take energy from the batteries and accelerate the car. Generators, on the other hand, are needed to produce the electrical power.
- Transmission System – The entire transmissions that were performed in a conventional car will be done here as well, but in the hybrid manner.

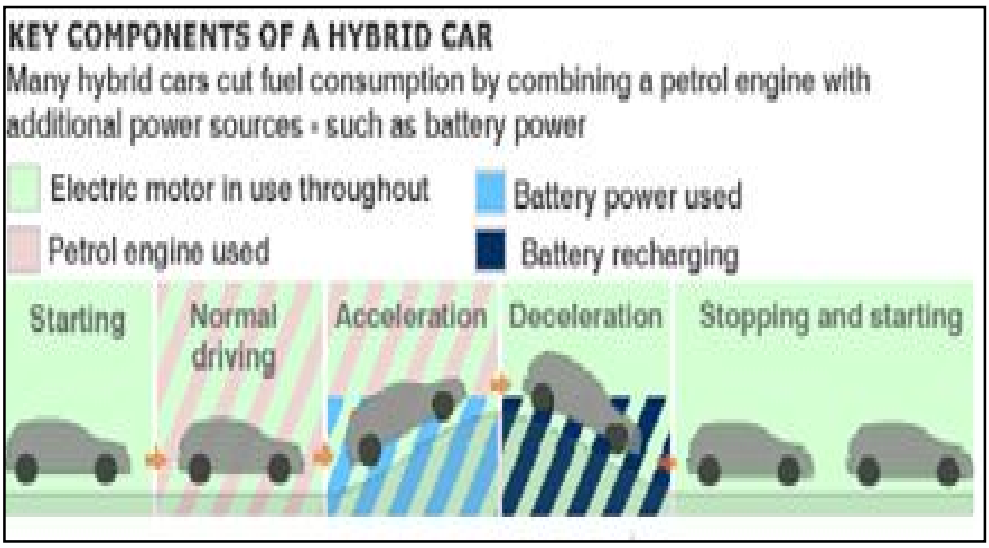

Figure 4: various key components of hybrid car

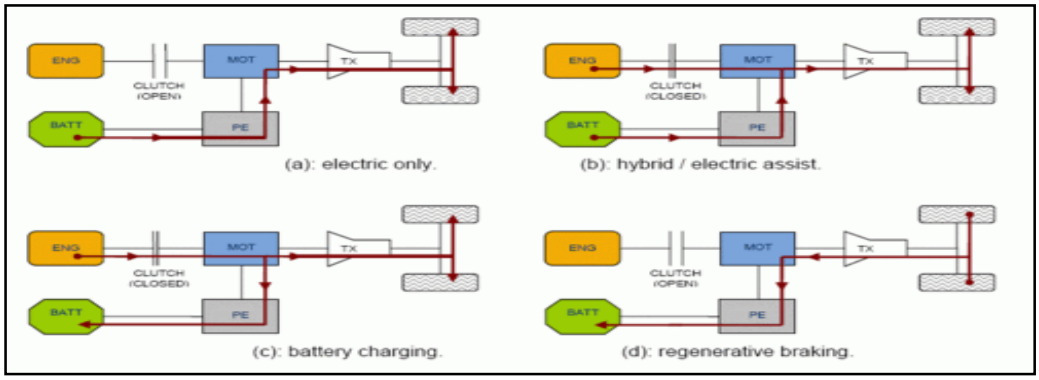

Figure 5: various stages of hybrid car

8.Working

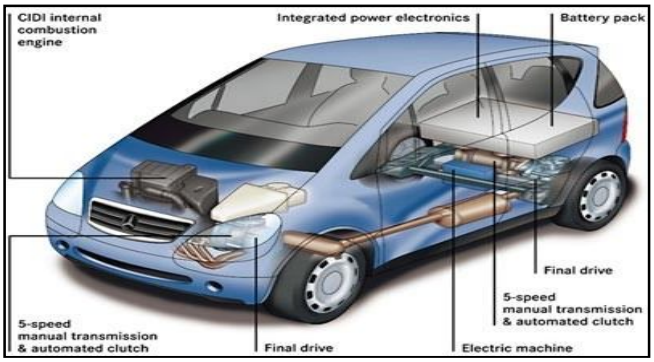

Figure 6: working of hybrid car

We are all familiar with gasoline based cars and most people have heard about or seen electric cars a hybrid car is a combination of the two. A hybrid vehicle contains parts of both gasoline and electric vehicles in an attempt to get the best of both worlds.

The best way to understand the advantages of a hybrid vehicle is to think about a car traveling down a highway at the posted speed on level ground. In this case, the engine is doing three things:

- It is overcoming rolling resistance in the drive train.
- It is overcoming air resistance.
- It is powering accessories like the alternator power steering pump and air conditioner

In a traditional hybrid vehicle, you have a complete electric car. It includes an electric motor to provide all of the power to the wheels, as well as batteries to supply the motor with electricity. Then you have a completely separate gasoline engine powering a generator. The engine is very small and it is designed to run at just one speed for maximum efficiency. The purpose of this small, efficient engine is to provide enough power for the car at its cruising speed. During times of acceleration, the batteries provide the extra power necessary. When the car is decelerating or standing still, the batteries recharge. This sort of hybrid car is essentially an electric car with a built-in recharger for longer range. The advantage is that the small, efficient gasoline engine gets great mileage. There are some Modes of hybrid car; these modes are used while the change of the position of the car takes place.

Electric vehicle mode: The engine is off, and the battery provides electrical energy to power the motor (or the reverse when regenerative braking is engaged). Used for idling as well the generator is directed towards charging the battery.

Overdrive mode: A portion of the rotational energy is siphoned off by the main electric motor, operating as a generator, to produce electricity. This electrical energy is used to drive the sun gear in the direction opposite its usual rotation. The end result has the ring gear rotating faster than the engine, albeit at lower torque.

Battery charge mode: Also used for idling, except that in this case the battery state-of-charge is low & requires charging, this is provided by the engine and generator.

Power boost mode: Employed in situations where the engine cannot meet the road load demand. The battery is then used to power the motor to provide a boost to the engine power.

Negative split mode: The vehicle is cruising and the battery state-of-charge is high. The battery provides power to both the motor (to provide mechanical power) and to the generator. The generator converts this to mechanical energy that it directs towards the engine shaft, slowing it down (although not altering its torque output). The purpose of this engine "lugging" is to increase the fuel economy of the vehicle. When the Battery State Of Charge (SOC) is high.

Cruise mode: The vehicle is cruising (i.e. not accelerating), and the engine can meet the load demand. The power from the engine is split between the mechanical path and the generator. The battery provides electrical energy to power the motor, whose power is summed mechanically with the engine.

9.Advantages

- Very less pollution.
- Better mileage.
- More reliable and comfortable.
- Very clean cars due to less emission.
- Batteries need not be charged by an external source.
- Warranties available for batteries as well as motors.
- Less dependence on fuels.

10.Disadvantages

- The initial cost will be very high – higher than other cars.
- Since a lot of batteries will be needed, the car will be very heavy.
- As there are electrical components, there is risk of shock during an accident.
- The vehicle can be repaired only by professionals.
- Spare parts will be very costly and rare.

11.Conclusion

Hybrid cars are good for the environment. Hybrid cars are one among the promising types of new generation cars. These cars are developed with an intention to answer much of these questions Hybrid cars are more reliable than electric cars from what we are seeing to date and they have gasoline as an alternate fuel. Most hybrid cars may cost a lot, but it's a good price to pay for something that will save you even more money in the long run. It will save the environment even more. Most people wouldn't buy a hybrid car because of the cost or how they look, but sooner or later it will be the car of choice.

12.Future Scope

In the near future hybrid batteries are going to be one of the biggest areas of hybrid vehicle development. Currently, hybrid vehicles utilize NiMH battery technology but it appears that the future will almost certainly be dominated by Lithium-ion batteries

All future hybrids will benefit significantly from these developments in hybrid battery, technology, but especially full hybrids, such as those from Toyota and Ford.

In the short term, there is a lot of potential for diesel hybrids, especially outside of the United States. Since diesel offers better fuel economy than gasoline, diesel hybrids would be more fuel efficient than gasoline hybrids. Additionally, many fans of plug-in hybrids seek to utilize home generated solar and wind power in which to 'plug-in' their hybrids.

The hydrogen hybrids are seen as a bridge to fuel cell hybrids because they could start laying the foundation for hydrogen fueling stations. While many see hydrogen hybrids as a 'bridge' to fuel cell vehicles, the truth is, most fuel cell vehicles will inevitably be fuel cell hybrid vehicles. Ultimately, hybrid vehicles aren't a bridge to fuel cell vehicles; they represent an integral piece of fuel cell vehicle technology.

13. Reference

1. The essential hybrid car hand book by Nick Yost, publishing Lyon pr
2. Electric and hybrid cars : A History by Judy Anderson and Curtis D. Anderson
3. The electric car : Development and future of battery, Hybrid and fuel cell cars by Mickel H. West brook
4. Hybrid vehicles and the future of personal transportation –Allen Fuhs
5. Electric and hybrid cars: A History – Curtis D.Anderson, Judy Anderson
6. Loh W.K. Refrew A.C."Optimised Microelectronic power control of an Ac drive for an Electric Vehicle", IEE PROCEEDINGS, Vol. 133, July, 1986.
7. Swartz H.J. "A summary of EHV Propulsion Technology" IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY, VOL VT-32, NO. 1 FEB, 1983
8. Wouk W.:"Hybrids: Then and Now", IEEE
9. The State of the Art of Electric and Hybrid Vehicles. IEEE Proceedings, Ausg. 90 Nr. 2, February 2002.