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Design and Fabrication of Hybrid Car

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ABSTRACT:The progress of automobiles for transportation has been intimately associated with the progress of civilization. The automobile of today is the result of the accumulation of many years of pioneering research and development. In the modern trend automobiles have certain disadvantages soon as fuel cost relative to mileage, pollution and less efficiency.

- To improve Efficiency.
- To decrease the fuel cost relative to mileage.
- To control the pollution is to be effect.

Our project deals with the design and the fabrication of a hybrid car. The goal of this project was to implement the most efficient and less polluting vehicle. In our project the hybrid electric vehicle model combines the internal combustion engine of a conventional vehicle with the battery and electric motor of an electric vehicle, resulting in twice the fuel economy of conventional vehicle. We implement this hybrid electric vehicle concept for two wheelers.

KEYWORDS:HEV, IC engine, CAD/CAE, Generator, Battery powered

I. INTRODUCTION

1) Since the last two decades the judiciary and policy makers all over the world are deeply concerned about the urgent need for protection of the environment, ecology and humanity at large, there has been a steep rise in the accumulation of greenhouse gases particularly CO₂, which effect global changes in weather.

2) Motor vehicle contribute about 14% of CO₂ from all sources besides, pollution due to both petrol and diesel engine driven vehicles caused by the emission of CO, no unburnt hydrocarbons, particulate and oxides of tetra ethyl, Lead are injury to health and environment.

3) Regulations on exhaust emission from vehicle engines have been made progressively more and more stipend towards the year 2000 and beyond, Vehicle manufactures have been hence obliged to meet these standards by designing cleaner and fuel efficiently engines and through provision for treatment of exhaust gases to satisfy the specified limits. So, to satisfy and overcome these two problems namely

- Pollution and
- Efficiency

Then we go for a hybrid vehicle.

II. LITERATURE REVIEW

Automobile hybridization is considered as an important step in reducing greenhouse gases and related automotive emissions. However, current hybrid electric vehicles are a temporary solution on the way to zero emission road vehicles. This paper discusses the use of hybrid electric vehicle power train. This vehicle allows a control strategy

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which includes both fuel-economy and performance modes. Recently there has been a lot of interest in the concept of hybrid electric vehicles, which have great potential to attain higher fuel economy and efficiency. How does a hybrid automobile work? What goes on under the hood to give you 20 or 30 more miles per gallon than the standard automobile? And does it pollute less just because it gets better gas mileage? This paper helps us to understand the technology behind these hybrid vehicles. A brief review of design considerations and selection of major components for hybrid electric vehicles is provided.

How Does a Hybrid Car Work?

In a traditional hybrid vehicle, we have a complete electric car. It includes an IC engine to provide all of the power to the wheels, as well as batteries to supply the motor with electricity and a completely separate gasoline engine powering a generator. The engine is very small (10 to 20 horsepower) and it are 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

Environmental Impact by HEV's

Fuel Consumption and Emissions Reductions

The hybrid vehicle typically achieves greater fuel economy and lower emissions than conventional internal combustion engine vehicles (ICEVs), resulting in fewer emissions being generated. These savings are primarily achieved by three elements of a typical hybrid design:

- Relying on both the engine and the electric motors for peak power needs, resulting in a smaller engine sized more for average usage rather than peak power usage. A smaller engine can have less internal losses and lower weight.
- Having significant battery storage capacity to store and reuse recaptured energy, especially in stop-and-go traffic typical of the city driving cycle.
- Recapturing significant amounts of energy during breaking that are normally wasted as heat. This regenerative braking reduces vehicle speed by converting some of its kinetic energy into electricity, depending upon the power rating of the motor/generator.

Any combination of these three primary hybrid advantages may be used in different vehicles to realize different fuel usage, power, emissions, and weight and cost profiles. The ICE in an HEV can be smaller, lighter, and more efficient than the one in a conventional vehicle, because the combustion engine can be sized for slightly above average power demand rather than peak power demand. The greater fuel economy of HEVs has implication for reduced petroleum consumption and vehicle air pollution emissions worldwide.

Noise

- Reduced noise emissions resulting from substantial use of the electric motor at idling and low speeds, leading to roadway noise reduction with comparison to conventional gasoline or diesel-powered engine vehicles.
- The reduced noise may not be beneficial for all road users, as blind people or the visually impaired use the noise of combustion engines a helpful aid while crossing streets and feel quiet hybrids could pose a negative impact.
- Hybrid vehicles are eco-friendly, as hybrids use NiMH batteries which can be recycled and that disposal will pose no toxic hazards and also does not release any harmful gases that help to give green earth.

III. COMPONENTS AND DESCRIPTION

The major parts that are effectively employed in the design and the fabrication of the hybrid car are described below:

- Battery,
- Bearing with Bearing Cap,
- Sprocket and chain drive,
- Motor,

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- Frame,
- IC engine.

IV. DESIGN CONCEPT

CAD/CAE

Computer aided design or CAD has very broad meaning and can be defined as the use of computers in creation, modification, analysis and optimization of a design. CAE (Computer Aided Engineering) is referred to computers in engineering analysis like stress/strain, heat transfer, flow analysis. CAD/CAE is said to have more potential to radically increase productivity than any development since electricity. CAD/CAE builds quality form concept to final product. Instead of bringing in quality control during the final inspection it helps to develop a process in which quality is there through the life cycle of the product. CAD/CAE can eliminate the need for prototypes. But it required prototypes can be used to confirm rather predict performance and other characteristics. CAD/CAE is employed in numerous industries like manufacturing, automotive, aerospace, casting, mould making, plastic, electronics and other general-purpose industries. CAD/CAE systems can be broadly divided into low end, mid end and high-end systems.

Low-end systems are those systems which do only 2D modelling and with only little 3D modelling capabilities. According to industry static's 70-80% of all mechanical designers still uses 2D CAD applications. This may be mainly due to the high cost of high-end systems and a lack of expertise. Mid-end systems are actually similar high-end systems with all their design capabilities with the difference that they are offered at much lower prices. 3D solid modelling on the PC is burgeoning because of many reasons like affordable and powerful hardware, strong sound software that offers windows case of use shortened design and production cycles and smooth integration with downstream application. More and more designers and engineers are shifting to mid end system.

Fig.1 shows the 3D CAD design of Hybrid car. High-end CAD/CAE software's are for the complete modelling, analysis and manufacturing of products. High-end systems can be visualized as the brain of concurrent engineering. The design and development of products, which took years in the past to complete, is now made in days with the help of high-end CAD/CAE systems and concurrent engineering.



Fig.1: Sample 3D drawing of hybrid car

V. MANUFACTURING PROCESS

Fig.2 represents a detailed flow chart of the manufacturing process. Manufacturing processes are the steps through which raw materials are transformed into a final product. The manufacturing process begins with the creation of the materials from which the design is made. These materials are then modified through manufacturing processes to become the required part. Manufacturing processes can include treating (such as heat treating or coating), machining, or reshaping the material. The manufacturing process also includes tests and checks for quality assurance during or after the manufacturing and planning the production process prior to manufacturing.

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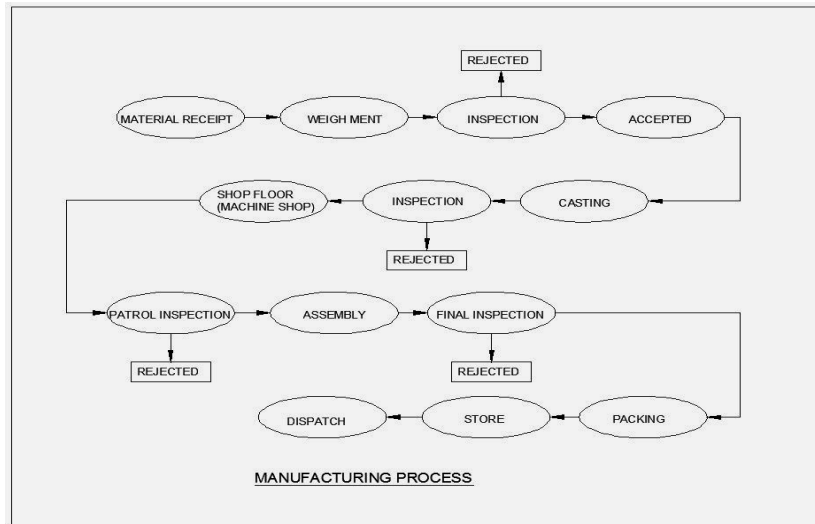


Fig.2: Detailed steps of manufacturing process

VI. WORKING PRINCIPLE

Fig.3 shows the Hybrid car. The working principle of this car basically involves two processes, the first process involves when the vehicle is running by means of internal combustion engine and the second process involves when the vehicle is running by means of an electric motor.

When the vehicle is driven at the outside of city the vehicle is powered by means of internal combustion engines. The power from the engine is taken and is transmitted to the wheels with the help of the sprocket and the chain drive and then it rotates the wheel.

At critical situations or when the fuel runs out, the vehicle is powered by means of a motor. The power to run the motor is supplied from the battery, as the battery. During this process the speed of the vehicle will be minimum and there is no smog forming pollutants produced during the vehicle runs. When the vehicle is powered by means of electric motor the power from the internal combustion engine will be disconnected from the shaft by loosening the belt. The mileage of the vehicle while running on the electric motor is mainly depends upon the time of charging and also depends upon the capacity of the battery. In this process the motor cum generator serves as motor as well as generator. It serves as a motor when the vehicle is running by means of battery and it serves as a generator when the vehicle is running by means of internal combustion engine.

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Fig.3: Hybrid Car

VII. ADVANTAGES, DISADVANTAGES AND APPLICATIONS

ADVANTAGES

- Simple in construction.
- Easy to fabricate.
- The components involved in the fabrication are simple and are easily available.
- This car helps at times when there is low or no fuel.
- The dependency on the fossil fuels all the time may be avoided.
- Fuels can be saved for the future generations.
- The pollutions are reduced to a considerable amount since the vehicle runs by engine at times only.

DISADVANTAGES

- More number of moving parts.
- Need skilled operators to repair and replace this car.
- Maintenance is needed.
- Only low loads are bearable when the car is in battery operated mode.

APPLICATIONS

- These types of hybrid cars have a wide range of applications in the fields like,
- All automobile industries,
 - Highly suitable for four wheelers.
 - Light vehicles.
 - Electric cars.

VIII. CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between the institution and the industries.

We are proud that we have completed the work with the limited time successfully. The **DESIGN AND FABRICATION OF HYBRID CAR** is working with satisfactory conditions. We can able to understand the difficulties in maintaining the tolerances and also the quality. We have done to our ability and skill making maximum use of available facilities.

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This project is an attempt to reduce our dependency on foreign oil and reduce the tailpipe emission from automobiles and this was an attempt to design and implement this new technology that will drive us into the future. Use of production hybrid cars will reduce smog-forming pollutants over the current national average. The first hybrid on the market will cut emissions of global-warming pollutants by a third to a half and later modes may cut emissions by even more.

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