ABSTRACT

The search for alternatives to petroleum economy, in automotive field must satisfy the energy requirements and to offer atleast the same performance than conventional vehicles. This work proposes a vehicle configuration that satisfies its real energy requirements and also obtains a reduced level of noxious emissions.

Hybrid Electric Vehicles (HEVs) combine the internal combustion engine (I.C ENGINE)of a convention vehicle with the battery and electric motor of an electric vehicle, resulting increased fuel economy than conventional vehicles. Hybrid cars serve the same purpose to get mileage and saves money on fuels.

This presentation proposes a trike i.e a vehicle with three wheels , eliminating the use of differential thus reducing weight considerably. This proposal will serve as a viable replacement for small and big engines (eg. Various range of automobiles and also for ships.) with a low initial cost and comparatively low running costs.

1. Introduction

Hybrid vehicle:

A **Hybrid vehicle** is a vehicle that uses two or more distinct power sources to move the vehicle. The term most commonly refers to Hybrid Electric vehicles**(HEVS)** which combine an internal combustion engine and one or more electric motors. However, other mechanisms to capture and utilize energy are included. Hybrid Cars use a rechargeable energy storage system to supplement fossil fuel energy for vehicle propulsion. Hybrid Engine are the smaller and more efficient than the traditional fuel engines. Some hybrid vehicles use regenerative braking to generate electricity while travelling . The term " **Hybrid Vehicle"** can also refer to a vehicle engine that uses a combination of different fuels such as Petroleum & ethanol, diesel and bio-diesel, other power-trains using fuel cells and LNG.

Heavy vehicles:

Hybrid power trains use diesel electric or turbo electric to power railway locomotives, buses heavy goods vehicles, mobile hydraulic machinery and ships. Typically some form of heat engine(usually diesel) drives an electric generator or hydraulic pump which powers one or more electric or hydraulic motors. There are advantages in distributing power through wires or pipes

rather then mechanical elements especially when multiple drives. Eg: driven wheels or propellers are required. There is power lost in the double conversion from typically diesel fuel to electricity to power an electric or hydraulic motor. With large vehicle the advantages often outweigh the disadvantages especially as the conversion losses typically decrease with size. Submarines are one of the oldest widespread applications of hybrid technology, running on diesel engine while surfaced and switching to battery power when submerged.

Ships with both mast – mounted sails and steam engines were an early form of hybrid vehicle. Another example is the diesel electric submarine. This runs on batteries when submerged and the batteries can be recharged by the diesel engine when the craft is on the surface. Newer hybrid ship propulsion scheme includes large towing kites manufactured by companies such as Sky Sails. Towing kites can fly at heights several time higher than the tallest ship mast, capturing stronger and steadier winds.

Manufacturing of Hybrid Trike:

We had practically experimented the hybrid power generation on a trike to show the basic requirements and its applications.

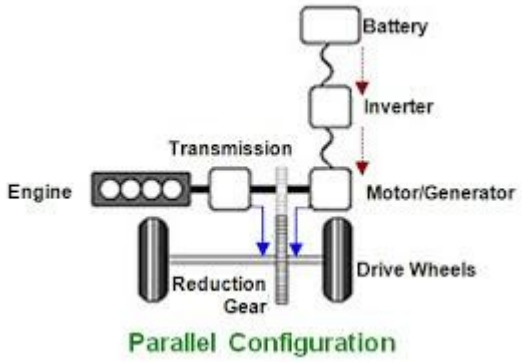
2. METHODOLOGY

TYPES OF HEV'S:

Hybrid electric vehicles can be classified according to the way in which power is supplied to the drive train:

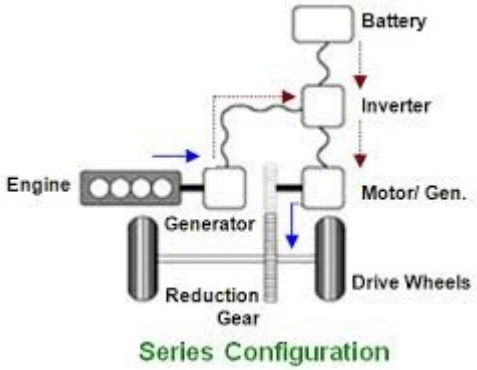
- In parallel hybrids, the ICE and the electric motor are both connected to the mechanical transmission and can simultaneously transmit power to drive the wheels, usually through a conventional transmission. The internal combustion engine of many parallel hybrids can also act as a generator for supplemental recharging. Currently, commercialized parallel hybrids use a full size combustion engine with a single, small (<20 kW) electric motor and small battery pack as the electric motor is designed to supplement the main engine, not to be the sole source of motive power from launch. Parallel hybrids are more efficient than comparable non-hybrid vehicles especially during

urban stop-and-go conditions where the electric motor is permitted to contribute, and

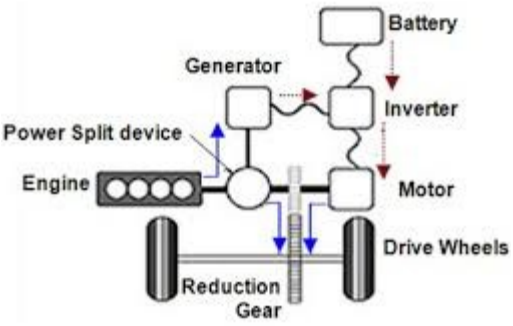


during highway operation.

- In series hybrids, only the electric motor drives the drivetrain, and a smaller ICE works as a generator to power the electric motor or to recharge the batteries. They also usually have a larger battery pack than parallel hybrids, making them more expensive. Once the batteries are low, the small combustion engine can generate power at its optimum settings at all times, making them more efficient in extensive city driving.

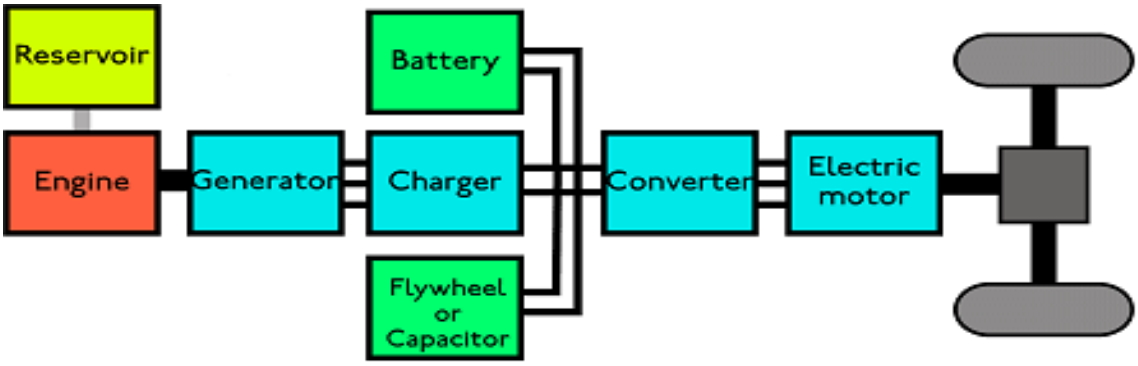


- Power-split hybrids have the benefits of a combination of series and parallel characteristics. As a result, they are more efficient overall, because series hybrids tend to be more efficient at lower speeds and parallel tend to be more efficient at high speeds; however, the cost of power-split the hybrid is higher than a pure parallel.



Power Split Configuration

Set up for HEV



Fuel Cells, Electric Hybrid :

The fuel cell hybrid is generally an electric vehicle equipped with a fuel cell. The fuel cell as well as the electric battery are both power sources, making the vehicle a hybrid. Fuel cells use hydrogen as a fuel and power the electric battery when it is depleted. The Chevrolet Equinox FCEV, Ford Hedge Hyseries Drive and Honda FCX are examples of a fuel cell electric hybrid.

Trike Configuration :

- A motorized tricycle's wheels may be arranged in either configuration: **delta or tadpole**. A **delta trike** has one wheel in front and two in back, and the **tadpole trike** has two wheels in front and one in back.
- Tadpoles are more stable under braking and more likely to slide instead of roll; front braking hard on a delta requires the vehicle to steer almost straight to avoid tipping.
- Since Tadpoles have the greater advantage of increased control while braking we have chosen the tadpole design.

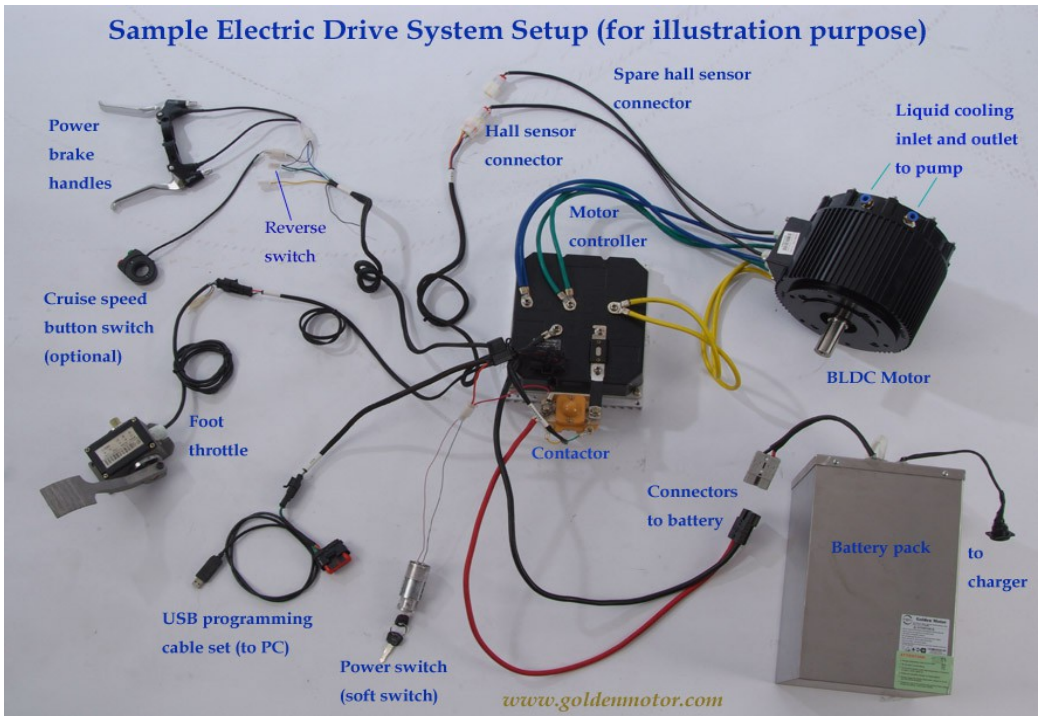
Vehicle Specification :

- Type : Plug-in Series Hybrid
- No of Seats : Two
- Motor : 1 HP;48 V; DC series
- Batteries : 4 X 12V; Lead acid
- Engine : 60cc; single cylinder; Petrol
- Generator : 1 HP; 48 V; DC series
- Chasis Type : Tadpole
- Speed Control : Potentiometer Accelerator

Motor :

Power : 800 watts
Voltage : 48V
Current : 40 Amps
Speed : 1500 rpm

Mounting : Flange
Shaft dia : 20 mm



3. RESULTS & DISCUSSIONS:

Engine Test Result

Top Speed	More than 60 km/hr
Acceleration(0 – 60)	15 sec
Mileage	45 km/hr
Breaking(40 – 0)	5m

Battery Charging Result

Battery Curent	26 Amp
Charger Current	10 Amp
Charge Cycle Time	2.6 hrs

Battery Discharging Result

Motor current at full load	20 Amp
Battery current	26 Amp
Discharge Time	1.3 Hrs
Range at 45 km/hr	58.5km

Motor Test Result

Top Speed	45 km/hr
Range at 45 km/hr	58.5 km

Combined Running

While running on engine the motor will start acting as a generator and starts generating electricity charging the batteries. Once the vehicles reaches the speeds above 45 km/hr the generator produces 20 Amp current thus charging the batteries

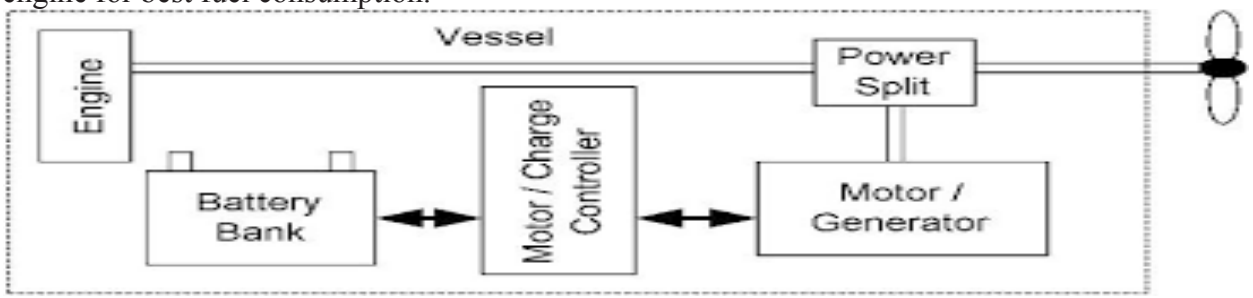
For 1 litre petrol

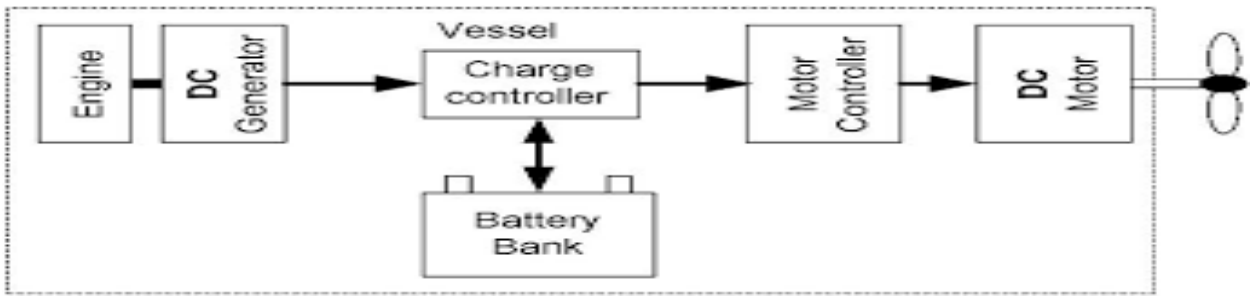
On engine	45 km
Battery charges at 45km/hr	20 Amp for 1 hr
Battery discharge	20 Amp
Motor range at 45 km/hr	45 km
Total Distance	90 km
Petrol Cost	69 Rs/ltr
Cost/ km	Rs 0.76

Discussions for Marine:

In an ideal hybrid drive system, choices are automatically made by the system to determine the most efficient source of power for a given load demand. In the case of a vessel the demands of the hotel load and propulsion load can be coupled together electrically and powered by a combination of power sources including generators, batteries, and alternative power sources. This will permit an operator to “tune” his operation into an extremely fuel efficient mode as opposed to traditional mechanically geared propulsion systems. In hybrid operation the engine in the system (e.g. a diesel generator) would run at a constant load. When this load suits the vessel’s propulsion needs then this power would be sent to the propellers (as electricity sent to a motor) and consumed in propulsion. But during those times when this power was not needed (e.g. during low-speed maneuvers) the engine would still produce the power, it would simply be

banked in an accumulator array (probably batteries.) Then, when power surges are required, the accumulator array is drawn upon and its power is added to the still continuous output of the engine. Thus the engine runs at steady load whenever it runs at all, while the motor is throttled up and down as usual. Because of this steady load on the diesel, it is possible to optimize the engine for best fuel consumption.





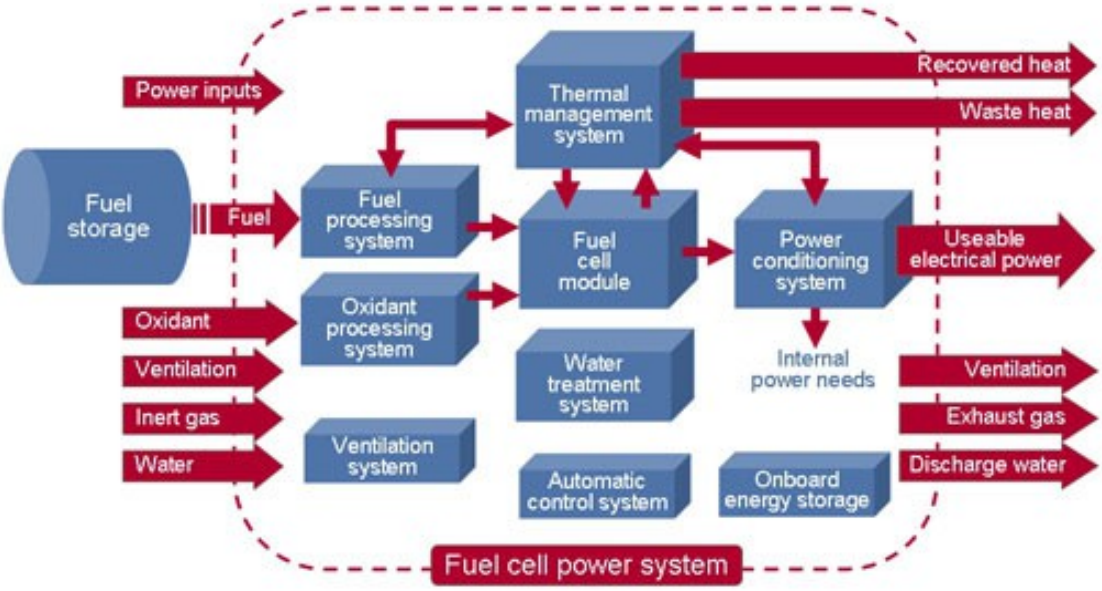
4. CONCLUSION & ITS FUTURE SCOPE

A tadpole trike was fabricated with two power sources an engine and an electric motor of suitable power enough to pull the vehicle comfortably. The required components were machined perfectly and properly assembled for perfect balance and easy mobility

The vehicle has given proven results with cost per km as low as 76 paise which is much less than existing two and four wheelers. The vehicle contribution to pollution is also reduced to half since it covers the additional distance on an electric motor.

We can use Hybrid Renewable Power Generation in Marine Engines in many ways:

Ship running on Fuel Cells


Power inputs
Fuel storage
Fuel
Oxidant
Ventilation
Inert gas
Water
Fuel processing system
Oxidant processing system
Ventilation system
Thermal management system
Fuel cell module
Water treatment system
Automatic control system
Power conditioning system
Internal power needs
Onboard energy storage
Recovered heat
Waste heat
Useable electrical power
Ventilation
Exhaust gas
Discharge water
Fuel cell power system


FLETTNER ROTORS FOR DIRECT HARVESTING OF THE WIND
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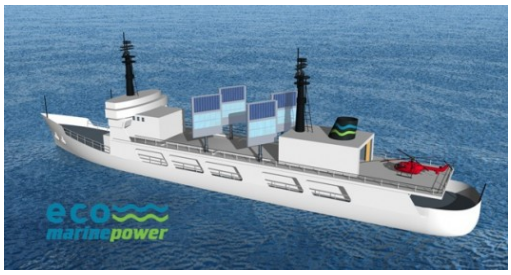
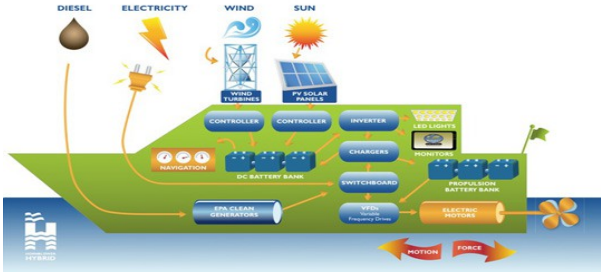
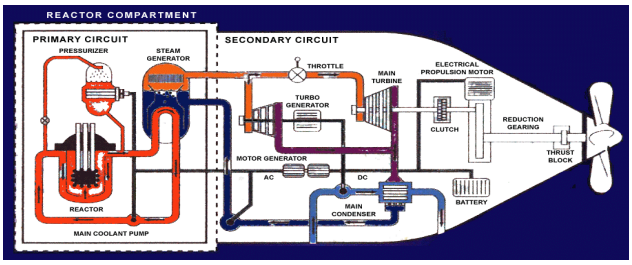
H2 TANKS
ZERO Scandlines EMISSION
H2
BATTERIES
FUEL CELLS
PROPELLER WITH E-MOTOR

Combination of Wind and Solar Energy :





Ships on Nuclear Power :



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- **The Electric Car :Development and Future Of Battery, Hybrid & Fuel Cell Cars (IEE POWER & ENERGY Series,38) illustrated edition by Michael Westbook.**
- **Future Cars :Green Designed :Bio-Fuel, Hybrid, Electrical,Hydrogen,Fuel Economy in all Sizes and Shapes by Ulrich Bethscheider-kieser (2008)**
- **Electric and Hybrid vehicles – Engines and power trains by Ronald K. Jurgen**
- **E- books.org**

HOPE OUR PRESENTATION HAS BEEN INFORMATIVE.WE WOULD LIKE TO THANK YOU FOR GIVING US THIS PLATFORM TO EXHIBIT OUR VIEWS ON THE TOPIC,"HYBRID RENEWABLE POWER GENERATION AND THEIR APPLICATIONS " FOR TRANSTECH 2015.


thank you!