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VOLVO TWIN ENGINE TECHNOLOGY

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Abstract

The twin engine technology uses 1.5L, 3 cylinder combustion engine and electric machine in combination in order to transmit power to wheels. This engine consists of three different mode i.e. pure, hybrid and power mode. In pure mode electric machine takes power from high voltage battery and transmit it to front wheel. In hybrid mode, combustion engine and electric motor work in intelligence, power is provided by combustion engine and simultaneously high voltage battery is charged. In power mode, electric machine work with combustion engine in order to give high speed performance.

Index Term: combustion engine, electric machine.

1. INTRODUCTION

“Volvo Cars has made a clear commitment to electrification across our entire product range. Our Twin Engine technology is a confident first step forward.

This technology delivers a no compromise balance of clean, efficient performance and exceptional driving pleasure. It is all about using the latest available technology to address unmet consumer needs,” says Dr Peter Mertens, Senior Vice President Research & Development at Volvo Car Group. Twin Engine Definition Volvo’s Twin Engine technology is essentially a combination of an internal combustion engine and electric power.

Electric energy from the grid can be stored in a High Voltage Battery.

The technology is more commonly known as Plug-in Hybrid

Technology (PHEV).

- PURE – where the car runs on electric power alone.
- HYBRID – where an optimal combination of the engine and electric machine propels the cars in a balanced and sustainable way.
- POWER – where all available power is used to deliver maximum performance.

Volvo’s Twin Engine set-up means that the high voltage battery is positioned in the tunnel console for maximum safety and also improved weight distribution that gives an improved driving experience.

“A Twin engine has two types of energy storage units, electricity and fuel. Electricity means that a battery (sometimes assisted by ultracaps) is used to store the energy, and that an electromotor (from now on called motor) will be used as traction motor.

Fuel means that a tank is required, and that an Internal Combustion Engine (ICE, from now on called engine) is used to generate mechanical power, or that a fuel cell will be used to convert fuel to electrical energy.

NEED OF TWIN ENGINE

Battery and transmit it to front wheel in order to make the car run on its wheel without the use of fossil fuel and improve the efficiency of the vehicle.

In hybrid mode, combustion engine and electric motor work in intelligence, power is provided by combustion engine and simultaneously high voltage battery is charged, this battery power can be

In early days number of vehicle were very less, hence problem associated to pollution was not that serious. But in last decade there is vast increase in percentage of vehicles on road. Hence we need to find any alternative solution to fossil fuel causing pollution. We can use renewable energy sources but to use them in moving vehicle either affect vehicle efficiency or performance. So we need such a technology that can satisfy all needs of vehicle such as good efficiency, less pollution and good performance.

This need can be satisfied by using twin engine technology, by using various modes provided by Volvo we can get good overall performance along with intelligent efficiency and less pollution.

If while travelling for short distance, we use pure mode, car will run on electric motor that do not cause any type of pollution and also is eco-friendly. Whereas we can use hybrid mode when we have to climb mountains or cross hilly region and if we really want to check the power of our Volvo cars, just use power mode that will combine power of ICE engine and electric motor to give

good powerful performance by taking care of fuel efficiency.

This was the main reason that Volvo developed twin engine in order to satisfy the changing need of this world.. Volvo has developed t5 and t8 engine by using this technology which will be used in SUV to fulfil the demand of people.

WHY TWIN ENGINE ?

- Declining fuel reserves
- Increasing Demand
- Environmental Degradation

An electric-powered car cannot go more than 100 miles (161 km) between recharging, is difficult to re-charge and doesn't drive beyond 60 mpg, although it emits little pollution hence twin engine is required.

2. WORKING PRINCIPLE:

Working principle of twin engine is quite easy to understand, as mentioned it consists of IC engine as well as electric motor.

Basically it consists of three modes in which the car can be driven which is as mentioned below :

- 1) PURE MODE
- 2) HYBRID MODE
- 3) POWER MODE

In pure mode electric machine takes power from high voltage and further used in pure mode and power mode.

In power mode, electric machine works with combustion engine in order to give high speed performance to the engine and the best possible performance output from the engine.

I. PURE MODE

In a pure mode, the electric motor is the only means of providing power to the wheels. The generator powers an electric motor that moves the vehicle. When large amounts of power are required, the motor draws electricity from both the batteries and the generator.

Pure mode can be assisted by ultracaps (or a flywheel: KERS=Kinetic Energy Recuperation System), which can improve the efficiency by minimizing the losses in the battery. They deliver peak energy during acceleration and take regenerative energy during braking. Therefore, the ultracaps are kept charged at low speed and almost empty at top speed. Deep cycling of the battery is reduced, the stress factor of the battery is lowered.

A complex transmission between motor and wheel is not needed, as electric motors are efficient over a wide speed range. If the motors are attached to the vehicle body, flexible couplings are required.

Advantages :

There is no mechanical link between the combustion engine and the wheels. The engine-generator group can be located everywhere.

The combustion engine can operate in a narrow rpm range (its most efficient range), even as the car changes speed.

Series hybrids are relatively the most efficient during stop-and-go city driving

Disadvantage :

Cannot travel at high speed.

It is not suitable for climbing or to ride in hilly region.

II. HYBRID MODE

Hybrid mode have both an internal combustion engine (ICE) and an electric motor work intelligently in assistance to each other . Most designs combine a large electrical generator and a motor into one unit, often located between the combustion engine and the transmission, replacing both the conventional starter motor and the alternator.

The battery can be recharged during regenerative braking, and during cruising (when the ICE power is higher than the required power for propulsion). As there is a fixed mechanical link between the wheels and the motor (no clutch), the battery cannot be charged when an automatic transmission car isn't moving.

While car is moving power is provided to wheel by means of IC engine and at a same time high voltage battery is also charged .this charging of the high voltage battery while moving of the car is known as intelligent working.

Advantages :

1. Total efficiency is higher during cruising and long-distance highway driving.
2. Battery is charged simultaneously while car is moving.

More power is provided to wheel of car as compared to pure mode.

Disadvantage :

1. As IC engine comes into play, pollution is more.
2. IC engine require fossil fuel for its operation.

III. POWER MODE

Power mode enable us to uses the total power of the Volvo car by combining the performance of electric motor and IC engine together.

Power-split devices are incorporated in the power train. The power to the wheels can be either mechanical or electrical or both. This is also the case in good for high performance.

In power mode the entire power of the electric machine obtained from the high voltage battery is used or transmitted to the wheels along with power of the internal combustion engine, hence maximum power output can be achieved by this technology.

This mode is suitable when we have to travel fast at high speed.

Advantages :

1. Maximum power output is obtained from the engine.
2. Suitable speed mode for highway.

Disadvantage :

1. Efficiency is adversely affected in this speed
2. Machine or engine design is complicated.

3. ADVANTAGES

1. We can drive car in various modes as per as our requirement.
2. IC Engine can be turned off in pure mode, hence fossil fuel consumption will be less.
3. Intelligent fuel efficiency.
4. Low fuel consumption.
5. High fuel efficiency.
6. One touch mode changing technology.

4. DISADVANTAGE

1. Complicated engine design
2. Technology loaded car is somewhat costly to afford.
3. Such type of Volvo cars are very expensive to manufacture.
4. Maintenance of such engine can cause lot of problem, due to complicated engine design and difficult to understand structure..
5. Cars owning this type of engine are quite expensive , hence it cannot be easily affordable.
6. In case of failure of regenerative braking concept in hybrid mode, it can greatly affect the efficiency of the vehicle.

5. CONCLUSION

Hence, this Volvo twin engine technology conclude that we need to adapt this technology in order to meet the changing needs of the world and also to reduce the consumption of fossil fuel.

This technology can easily improve the efficiency of the vehicle, hence it is very important technology from future point of view in order to yo reduce the consumption of the fossil fuel.

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