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Hybrids

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History of hybrids

Henri Pieper in 1899 developed the world's first petro-electric hybrid automobile and in 1900 Ferdinand Porsche developed a series-hybrid using two motor-in-wheel-hub arrangements with an internal combustion generator set providing the electric power, setting two speed records.

A hybrid vehicle uses two or more distinct types of power, such as internal combustion engine + electric motor.

Modern hybrids

Automotive hybrid technology became widespread beginning in the late 1990s. The first mass-produced hybrid vehicle was the Toyota Prius, launched in Japan in 1997, and followed by the Honda Insight, launched in 1999 in the United States and Japan. The Prius was launched in Europe, North America and the rest of the world in 2000.

The most common form of HEV is the hybrid electric car, although hybrid electric trucks (pickups and tractors) and buses also exist.

Modern HEVs make use of efficiency-improving technologies such as regenerative brakes, which converts the vehicle's kinetic energy into electric energy to charge the battery, rather than wasting it as heat energy as conventional brakes do. Some varieties of HEVs use their internal combustion engine to generate electricity by spinning an electrical generator (this combination is known as a motor–generator), to either recharge their batteries or to directly power

the electric drive motors. Many HEVs reduce idle emissions by shutting down the ICE at idle and restarting it when needed; this is known as a start-stop system.

Worldwide sales

Over 10 million hybrid electric vehicles have been sold worldwide by July 2015.

The most popular companies ,producing hybrid cars, are:

Toyota Motor Co.;

Honda Motor Co.;

Kia Motors;

Ford Motor Co.;

Hyndai Motor Co.;

There are 3 common types of powertrain:

1) parallel hybrid;

2) series hybrid;

3) series-parallel hybrid;

Parallel hybrids

- 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 supple .Currently, commercialized parallel hybrids use a full size combustion engine with a single, small (<20 kW) electric motor and small battery pack.
- 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.

Series hybrids

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.

Series-parallel hybrids

Power-split hybrids or series-parallel hybrids are 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 system is the decoupling of the power supplied by the engine (or other primary source) from the power demanded by the driver.

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. Ford's hybrid system, Toyota's Hybrid Synergy Drive and General Motors/Chrysler's Two-Mode Hybrid technologies are full hybrid systems.

A 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 plug-in hybrid electric vehicle (PHEV), also known as a plug-in hybrid, is a hybrid electric vehicle with rechargeable batteries that can be restored to full charge by connecting a plug to an external electric power source. A PHEV shares the characteristics of both a conventional hybrid electric vehicle, having an electric motor and an internal combustion engine, and of an all-electric vehicle, also having a plug to connect to the electrical grid.

Fuel consumption

Current HEVs reduce petroleum consumption primarily by using three mechanisms:

1) Reducing wasted energy during idle/low output, generally by turning the ICE off;

2) Recapturing waste energy (i.e. regenerative braking);

3) Reducing the size and power of the ICE, and hence inefficiencies from under-utilization, by using the added power from the electric motor to compensate for the loss in peak power output from the smaller ICE.

Charging stations

Nowadays the problem of hybrids is little number of stations, where you can recharge a battery of your vehicle. Also, it takes too much time to charge the battery full.

Noise

Hybrids have reduced noise emissions by using electric motor. Reduced noise may not be beneficial for all road users. Tests have shown that vehicles operating in electric mode can be particularly hard to hear below 20 mph (32 km/h).That's why hybrids may be dangerous for blind people crossing the road.

Pollution

Battery toxicity is a concern, although today's hybrids use NiMH batteries, not the environmentally problematic rechargeable nickel cadmium .Toyota and Honda say that they will recycle dead batteries and that disposal will pose no toxic hazards. Toyota puts a phone number on each battery, and they pay a $200 "bounty" for each battery to help ensure that it will be properly recycled.