Fuel Cells, Flywhheels, And Hybrids Essay, Research Paper

Fuel Cells, Flywheels and Hybrids

There are three types of experimental vehicle (EVs) propulsion technologies on the

currently being tested. Batteries are currently the most popular power source for modern

EVs but they are by no means the only available technology. A number of alternatives are

under development and they, too, are well positioned to rival batteries as an effective EV

power source.

1.Fuel cells

Some of the most recent and exciting news in electric-vehicle development has centered

around a new power source, called the fuel cell.

?The fuel cell utilizes a special membrane to generate electricity through the controlled

reaction between hydrogen and oxygen atoms. ?Unlike batteries, which store electricity

rather than generate it, fuel cells actually produce electricity through a controlled

chemical reaction between hydrogen and oxygen.

Inside a fuel cell, the two elements are fed to opposite sides of a porous membrane. As

hydrogen atoms pass through the pores, they are stripped of their electrons. This results

in a negative charge on the membrane?s hydrogen side and a positive charge on the

oxygen side. Stacking fuel cells in series produces enough power to operate a vehicle.

Unfortunately, there is a downside to this innovative system?hydrogen is extremely

volatile. It is also difficult to store and unavailable at local filling stations. Chrysler

Corporation is currently working on a fuel cell that eliminates some of these obstacles,

notably storage and inconvenience. Their efforts may make fuel cells a viable option in

the near future.

One of Chrysler?s plans is to use small amounts of gasoline in fuel cells. Doing so would

eliminate the dangerous proposition of storing hydrogen onboard an EV before

converting it to electricity. A series of reaction chambers in the system would convert the

gasoline to hydrogen as needed, and carbon monoxide?produced as a

byproduct?would be processed in additional chambers that would convert it to harmless

carbon dioxide.

2.Flywheels

Another departure from chemical-based battery technology is the flywheel. All flywheels,

including those presently on vehicle engines, act as sort of mechanical batteries, storing

energy by spinning. Friction, of course, is their enemy. In new flywheel technology plans

are to create a nearly frictionless environment?essentially a vacuum?around the

flywheel by enclosing it in a shell and mounting it on liquid or magnetic bearings.

To create electricity, magnets mounted on the flywheel would pass close by tightly

wound wires lining the shell?s interior. Drawbacks are that charging such a system

requires some initial force to get the flywheel up to operating speed (which can be as

high as 100,000 rpm) and that lightweight but strong composites instead of common

metals must be used to construct the flywheel to prevent it from breaking apart.

3.Hybrids

Hybrid vehicles typically feature two different power sources?working either in parallel

or in series?to propel the vehicle. Much research is under way combining gasoline or

diesel-fueled internal combustion engines with electrically powered motors to get the job

done.

In a parallel setup, both power sources drive the wheels. For example, an electric motor

may accelerate the car to highway speeds, whereupon a small internal combustion

engine, or ICE, then takes over to power the wheels for cruising. With this system, the

ICE need only be large enough to maintain speed, and the energy supply for the electric

motor need not provide long range.

In a series setup, power from both engine sources is sent to a single additional motor or

controller that drives the wheels. In such a vehicle, an electric motor might run on

batteries that in turn could be charged by a generator operated by a small internal

combustion engine. Such a combination could extend the range of an EV considerably.

Already there has been an example of a hybrid vehicle, albeit extreme: the Chrysler

Patriot race car project of the early ?90s. The Patriot used liquefied natural gas to fuel an

internal combustion engine that, in turn, spun two turbines providing electricity. A

flywheel generated additional power.

All the electricity was controlled by a computer that both delegated which power source

(turbines or flywheel) to draw from and then directed that power to the motor driving the

wheels. In all, the turbines and flywheel produced about one megawatt of energy, which

was how the Patriot was expected to reach speeds approaching 200 mph.

These new power sources will revolutionize the transportation industry. They will

replace gasoline as the predominant enegy source of our vehicles.