Grant Slinger
Senior Division Energy & Transportation

H_2O - Water or Fuel? Effects of a Water Fuel Cell on the Efficiency of an Internal Combustion Engine

With the price of gas reaching almost $4.00 a gallon, and the obvious effects of vehicles' emissions on global warming, why aren't auto manufacturers doing more to improve the fuel efficiency of today's automobiles? Technologies exist that can greatly increase the efficiency of the internal combustion engine. This science project tests the effect on fuel economy by adding supplemental hydrogen and oxygen gas to an internal combustion engine through an onboard water fuel cell. The water fuel cell simply converts a mixture of water and electrolyte into a stoichiometric mixture of hydrogen and oxygen through the process of electrolysis. This mixture can then be burned along with gasoline in an internal combustion engine. The power for electrolysis comes from the vehicle's battery that is constantly being recharged by the alternator. The test vehicle was driven several times around the test course (47.4 miles round trip) with and without the electrolysis unit, and the fuel mileage was recorded after each run. A baseline of 17.78 miles per gallon was achieved in the completely stock vehicle. The observed fuel mileage in the modified vehicle ranged from 20.76 to 23.26 depending on the variable being tested. The results from the test concluded that the addition of a water electrolysis unit can increase the fuel economy of a full size vehicle by up to 30%. The tests also showed that the amount of gas being produced, and where it was injected into the engine, had an effect on the fuel efficiency.