

Hydrogen Fuel for Automotive Applications

Dr N Saravanan

Principal Engineer, Mahindra Research Valley

Abstract:

The world at present is heavily dependent on petroleum fuels and the importance of alternative fuel research for internal combustion engines needs emphasis. Diesel engines are the main prime movers for public transportation vehicles, stationary power generation units and agricultural applications also Gasoline vehicles are primarily used for the personal mobility. Therefore it is important to find a best alternative fuel, which emits fewer pollutants to the atmosphere. In this regard, hydrogen is receiving considerable attention as an alternative source of fuel to replace the rapidly depleting petroleum resources. Its clean burning characteristics provide a strong incentive to study its utilization as a possible alternate fuel. The major advantage of hydrogen fueled engine is that they emit fewer pollutants (renewable source) than diesel fueled engine. In hydrogen fueled engine the principal exhaust products are water vapor and NOX. In fuel cell there is no emissions. There are a lot of research on fuel cells, which yields very promising results, yet at other side it has several drawbacks such as cost, bulkiness and low efficiency at high loads.

Emphasis on Hydrogen Oxygen reaction mechanism, number of designs, and specially engine operation strategies that utilizes the full potential of hydrogen for high efficiency and low tail pipe emission is Critical. This includes the significant progress required in hardware up gradation, external & In-cylinder mixture formation strategy and safety requirement to make a conventional engine to run on hydrogen. The unique properties of hydrogen also require special attention when designing a safety concept for in vehicle application. By adopting the hydrogen sensors, flame detectors and a proper ventilated design, operational safety of hydrogen fueled can be achieved.

Hydrogen-fueled internal combustion engine can serve as a near-term option for a transportation in a hydrogen economy. The significant advancement and progressive work shows an excellent prospects to achieve very satisfactory IC engine, Fuel cell operation with hydrogen as fuel to achieve future performance and emission requirement.