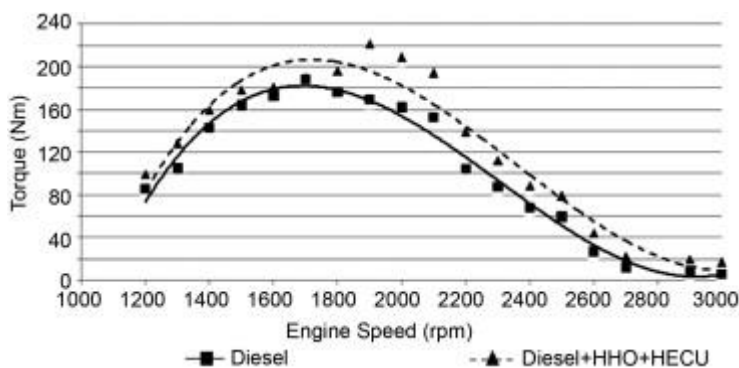


"Dyno" Report/ Results on Engine Performance details using Hydrogen dual fuel in trucks



Engine 's Torque

Engine torque increases An average of 19.1% increment when using Hydrogen with diesel fuel compared to pure diesel operation. This increase in Power and torque a result of the enhanced combustion achieved by adding hydrogen and the superior fuel / oxygen/ hydrogen mixing.



The chart clearly show that the addition of hydrogen gas (commonly known as HHO) increases the extent and volume of the burning charge and extends the flammability limit to lower equivalence ratios in the engine.

Hydrogen gas mixed with the stoichiometric ratio of oxygen has a very low Ignition energy (also known as activation energy) and an extremely fast flame speed (1800 times that of diesel). As a result the hydrogen and diesel mixture is more easily ignited , burning far faster than pure diesel. This results at improved engine torque at all engine speeds.



Engine 's Temperature

High laminar flame velocity of hydrogen produces decreased ignition delay and a shortened combustion period at the top of the power stroke, providing much lower heat losses, a more ideal constant-volume combustion. This results in increased compression ratio and thermal efficiency. Adiabatic Expansion in Much of the power stroke and a **lower engine temperature**.



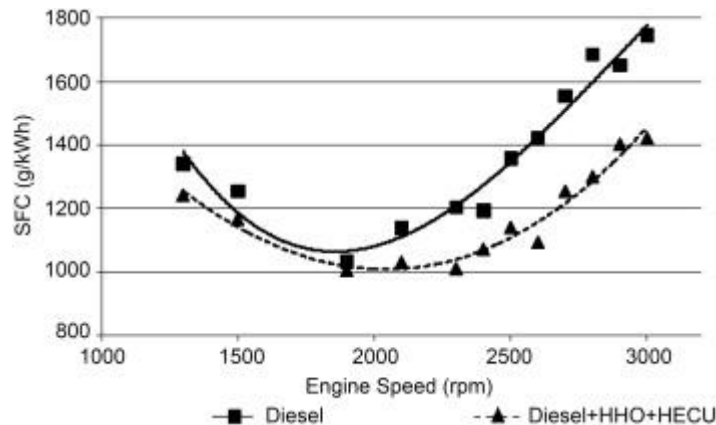
Engine's Noise

The High combustion velocity of Hydrogen provides faster increment in Pressure and Temperature which may minimize the knockingspecially at idle conditions (low or no load). **Also, ignition delay period reduction yields diminished engine noise.**



Fuel Consumption

Clients report An average gain of more than 20% is achieved on SFC-Specific Fuel Consumption by using Hydrogen fuel System in their diesel or petrol fuelled vehicle. The High Diffusivity of hydrogen gas and the Uniform mixing of Hydrogen and air and the increased oxygen in combustion chamber yields better combustion at all engine speeds. The higher fuel savings occur at high speeds because diesel fuel is hard to be completely burnt at lean conditions due to the increased residual gas fraction and poor mixing. Since Hydrogen has a high flame speed and has wide flammability, the addition of a stoichiometric volume of hydrogen will help the fuel to be burned faster and more complete.



Carbon Emissions

Laboratory and field tests show an average reduction of 35% in CO emissions at mid and high engine speeds. The absence of carbon in Hydrogen fuel gas is a major reason for CO emissions reduction. Wide flammability range and high flame speed of Hydrogen gas ensure engine to be operated at lower loads. The Hydrogen+diesel fuel mixture burns faster and more completely than the pure diesel fuel. Combustion with hydrogen provides increased engine Power and torque and therefore requires less fuel burnt per second to provide the required work. With Less fuel used , less carbon , carbon monoxide CO is produced. Thus, CO emission are reduced at high speed and lean fuel ratio conditions.

