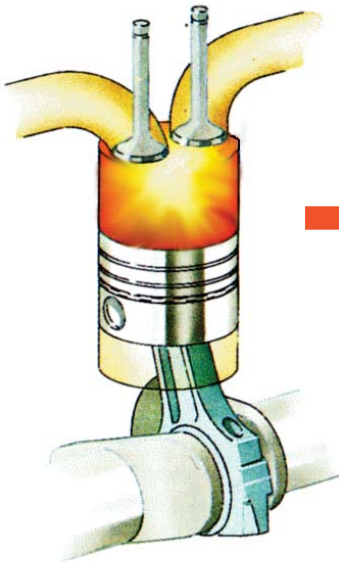




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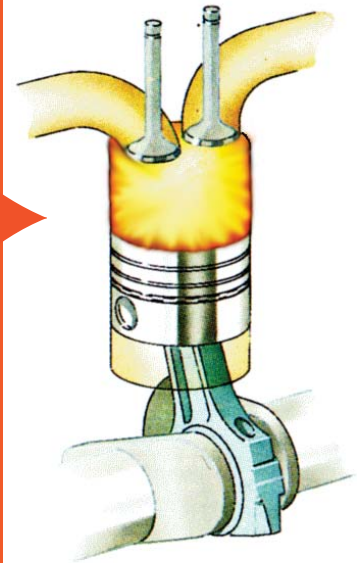
What does Hydrogen/Oxygen Injection Actually Do?



Before

In a typical diesel engine, maximum heat from compression occurs in the centre area of the cylinder, leaving fuel at the cylinder walls unburned. This is especially prevalent at idle.

Hydrogen burns 10 times faster than diesel. Injecting a small amount of H₂O₂ accelerant gases expands the flame front across the entire cylinder volume. This provides greater horse power, improved fuel efficiency, lower diesel particulate and NO_x emissions.



After



An Empire Hydrogen Fuel Enhancement System on your truck can add 1/2 gear to horsepower, improve fuel efficiency by 10% - 20%, reduce diesel particulates by 2/3 and smog causing NO_x by 48%.

Contact Empire Directly: (778) 426-0911

Andrew@EmpireHydrogen.com, www.EmpireHydrogen.com

How do Hydrogen/Oxygen Accelerant Gas systems work?

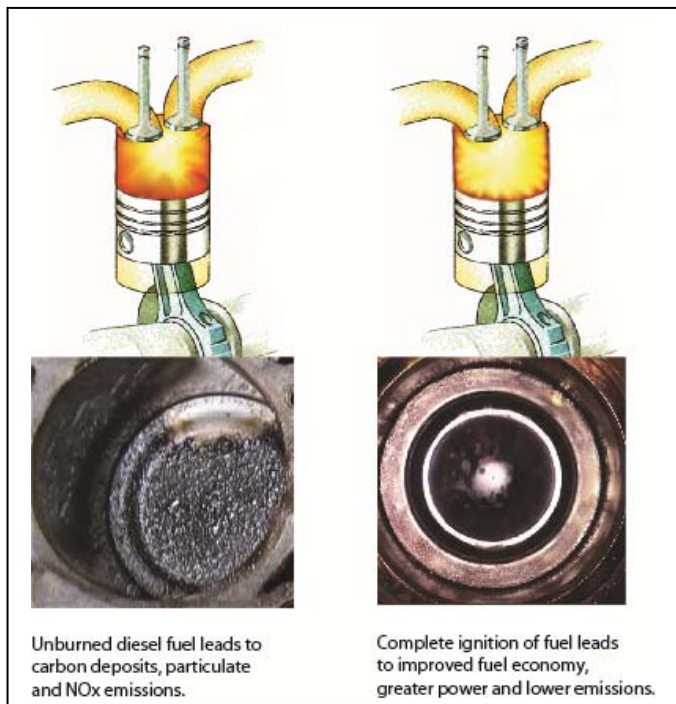
By Andrew Evans – Empire Hydrogen Energy Systems Inc.

How is it possible for an H₂,O₂ accelerant gas system to improve fuel efficiency by 10% - 20%, increase horsepower by ½ gear, reduce diesel particulates by 2/3 and smog causing NO_x by 48%? It all comes down to the unburned fuel that exhausts from every diesel truck.

The problem is that diesel fuel does not burn uniformly across the cylinder combustion chamber. Diesel in hot spots near the centre of the cylinder burns well. But fuel around the cooler cylinder walls does not ignite at all or does not burn completely during the brief ignition cycle. This unburned fuel leaves the truck in three ways:

1. Carbon Monoxide (CO) where the oxidation process does not occur completely;
2. Hydrocarbons (HC) which is simply raw diesel, unburned because the air-fuel mixture does not achieve the necessary temperature for combustion;
3. Diesel Particulate Matter (PM) which is the agglomeration of very small particles of partly burned fuel, partly burned lube oil, ash content of fuel oil, and cylinder lube oil or sulfates and water.

These emission problems are greatest during idling, light loads, or periods of irregular operating conditions where rapid change in engine speed contribute to unburned fuel.



An H₂,O₂ accelerant gas system injects a very small amount (200ppm) of hydrogen and oxygen gases into the air intake of the diesel engine. Hydrogen has a flame speed of nearly 300 centimeters per second, or ten times faster than the diesel flame speed of 30 cm/s. Thus with even a very small amount of hydrogen gas, the flame front expands across the entire cylinder volume in 1/10th the time. The result of this dramatically expanded flame front is that virtually all of the diesel fuel is ignited and burned, including the fuel in the centre and around the cylinder walls.

A further problem with diesel engines is the exhaust of Nitric Oxide (NO_x), one of the major smog causing chemicals. NO_x arises when normal nitrogen and oxygen from the air chemically combine at high diesel engine temperatures. A properly designed H₂,O₂ system also allows a controlled amount of moisture to travel into the

air intake along with the accelerant gases. This is much less moisture than would be experienced on a normal foggy day. During evaporation, this moisture acts as a heat sink, reducing temperature spikes and cutting NOx production by half.

Thus the fuel efficiency and emission reductions benefits of an H₂,O₂ accelerant gas system are obtained simply because all of the formerly unburned diesel fuel and the various by-products are burned. A driver can ease off the throttle and still reach the normal operating speed and power.

Of course another benefit of improved diesel combustion is greater horsepower. No longer is unburned fuel being sent out the exhaust. All of the energy from the fuel is transferred to the drive train, giving the power needed to climb over the longest hills. Truckers tell us that the increase in power is about ½ a gear.



The Empire Hydrogen Fuel Enhancement System splits distilled water into H₂,O₂ accelerant gases through electrolysis. A strong electric current is passed through an electrolytic solution between a series of stainless steel plates. Water (H₂O) is split into separate H₂,O₂ gas molecules that are injected directly into the truck's air intake just in front of the turbocharger, giving all of the fuel efficiency, horsepower and emissions benefits described in this article.

More information on these systems can be seen at www.EmpireHydrogen.com or Andrew@EmpireHydrogen.com.