

## Investor Release – September 11, 2017

### Empire Hydrogen Starts Advertising Program

**Empire Hydrogen Energy Systems** has started our advertising program in Western Trucking Magazine. We have purchased full page ad space for the next 12 months to educate truckers about our hydrogen / oxygen injection technology and to introduce the company. In addition, Western Trucking is providing Empire with free space for articles. We will use these to further inform on the technical details of the technology. Below is a photo of the August issue article and ad. The full details are attached as a pdf file.



**EMPIRE HYDROGEN ENERGY SYSTEMS INC.**

### How Do Hydrogen/Oxygen Accelerant Gas Systems Work?

**HYDROGEN**

How is it possible for an H<sub>2</sub>O<sub>2</sub> accelerator gas system to improve fuel efficiency by 10% - 20%, increase horsepower by 1/2 gear, reduce diesel particulates by 2/3 and smog causing NOx by 40%? It all comes down to the accelerated fuel that exhausts from every diesel truck.

The problem is that diesel fuel does not burn uniformly across the cylinder combustion chamber. Instead, it hot spots near the center of the cylinder. Areas with hot fuel around the center cylinder walls does not ignite at all or does not burn completely during the brief ignition cycle. The unburned fuel leaves the truck in three ways.

Carbon monoxide (CO) where the oxidation process does not occur completely.

Hydrocarbons (HC) which is simply raw diesel, unburned because the air fuel mixture does not achieve the necessary temperature for combustion.

Unburnt particulate matter (PM) which is the agglomerate of very small particles of partly burned fuel, partly burned fuel oil, and cylinder tube oil or sulfate and water.

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

An H<sub>2</sub>O<sub>2</sub> accelerator gas system injects a very small amount (200 ppm) of hydrogen and oxygen gases into the air intake of the diesel engine. Hydrogen has a flame speed of nearly 3000 centimeters per second, or 100 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 crevices and around the cylinder walls.

A further problem with diesel engines is the exhaust of nitric oxide (NOx), one of the most smog causing chemicals. NOx arises when normal nitrogen and oxygen from the air chemically combine at high diesel engine temperatures. A properly designed H<sub>2</sub>O<sub>2</sub> system also allows a controlled amount of moisture to travel into the air intake along with the accelerator gas. This is much less moisture than would be experienced on a normal foggy day during engine start. NOx molecules act as a heat sink, reducing temperature spikes and slowing HC production by fuel.

Thus the fuel efficiency and emission reduction benefits of an H<sub>2</sub>O<sub>2</sub> accelerator gas system are obtained simply because all of the normally unburned diesel fuel and the various by products are burned. A driver can raise off the throttle and still reach the normal operating speed and power.

Of course another benefit of improved diesel combustion is greater horsepower. As Kingtec Transport Refrigeration Systems has long known, 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 biggest hills. The driver will see that the increased horsepower is about 1/2 a gear.

The Empire Hydrogen Fuel Enhancement System injects distilled water into H<sub>2</sub>O<sub>2</sub> accelerator gases through electrolysis, a strong electric current is passed through an electrolytic solution between a series of stainless steel plates. Water (H<sub>2</sub>O) is split into separate H<sub>2</sub> and O<sub>2</sub> 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 emission benefits described in this article.

More information on these systems can be seen at our website, [www.EmpireHydrogen.com](http://www.EmpireHydrogen.com) or email, [Andrew@EmpireHydrogen.com](mailto:Andrew@EmpireHydrogen.com)

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### What does Hydrogen/Oxygen Injection Actually Do?

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 H<sub>2</sub>O<sub>2</sub> accelerator gases expands the flame front across the entire cylinder volume. This provides greater horse power, improved fuel efficiency, lower diesel particulate and NOx emissions.

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 NOx by 40%.

Contact Empire Directly: (778) 426-0911  
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2017 Western Star Trucks with H<sub>2</sub>O<sub>2</sub> accelerator gas system installed.

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For more information please contact Sven Tjelta or Andrew Evans at Empire Hydrogen at 778.426.0911.